African Invertebrates Vol. 46 Pages 141–179 Pietermaritzburg December, 2005

Eight new species of *Scrapter* (Hymenoptera: Apoidea: Colletidae), with descriptions of *S. albifumus* and *S. amplispinatus* females and a major range extension of the genus

by

G. B. P. Davies[1,2], **C. D. Eardley**[3] and **D. J. Brothers**[1]

[1]School of Biological & Conservation Sciences, University of KwaZulu-Natal, P. Bag X01, Scottsville 3209, South Africa; [2]Department of Arthropoda, Natal Museum, P. Bag 9070, Pietermaritzburg 3200, South Africa; gdavies@nmsa.org.za; [3]Biosystematics Division, Plant Protection Research Institute, Agricultural Research Council, P. Bag X134, Queenswood 0121, South Africa

ABSTRACT

Scrapter Lepeletier de Saint-Fargeau & Audinet-Serville, 1828 (Hymenoptera: Colletidae *incertae sedis*) is a genus of rather diverse colletid bees, with poorly elucidated phylogenetic affinities. Eight new species of *Scrapter* are described, principally from the Succulent Karoo biome of South Africa. The new species are: *Scrapter acanthophorus* Davies, sp. n. (male only), *S. carysomus* Davies, sp. n. (male only), *S. catoxys* Davies, sp. n. (both sexes), *S. chrysomastes* Davies, sp. n. (male only), *S. eremanthedon* Davies, sp. n. (both sexes), *S. glarea* Davies, sp. n. (male only), *S. oxyaspis* Davies, sp. n. (male only) and *S. sittybon* Davies, sp. n. (male only). An updated key to the genus is provided. The previously unknown females of *S. albifumus* Eardley and *S. amplispinatus* Eardley are also described. The genus is recorded from outside southern Africa for the first time, with the collection of *S. nitidus* (Friese) in Kenya. This constitutes a significant extension of the range of the genus. The importance of the Succulent Karoo biome to *Scrapter*, and the indigenous bee fauna of South Africa, is underscored.

KEY WORDS: bees, Colletidae, new species, *Scrapter*, Succulent Karoo, taxonomy.

INTRODUCTION

Scrapter Lepeletier de Saint-Fargeau & Audinet-Serville, 1828 (Hymenoptera: Colletidae *incertae sedis*) is a large genus of phylogenetically enigmatic bees. The genus is composed of morphologically rather diverse bees, varying from strongly hirsute, robust, andreniform species to small, sparsely hirsute, elongate, hylaeiform species. The bees appear to represent a monophylum, but sub-clades are evident within the taxon, and the recognition of several genera may be justified. This topic will be addressed elsewhere, and a proposed phylogeny for the taxon presented. *Pro tempore*, we retain an inclusive genus *Scrapter*.

Michener (2000) placed *Scrapter* in the subfamily Colletinae, which has often been divided into two tribes, Colletini and Paracolletini (e.g. Michener 1944), with *Scrapter* traditionally associated with the paracolletine bees. However, phylogenetic analyses of larval and adult morphology have revealed the Colletinae to be a non-monophylum, and have questioned the placement of *Scrapter* in this subfamily (McGinley 1981; Alexander & Michener 1995).

McGinley (1981) presented evidence, based principally on three larval characters (relation of hypostomal ridge to head capsule; orientation of maxillary palpus; structure of salivary lips), that *Scrapter* was the sister-group to the exclusively Australian subfamily Euryglossinae. McGinley (1981: 160) was, however, cautious in his conclusion, stating

'…that *Scrapter* is misplaced within the Paracolletini remains at present only a highly tentative conclusion based on larval characters. The character states involved are quite simple in nature and the possibility of parallelism is high'. Should *Scrapter* be the sister-group to the Euryglossinae, that would imply an intriguing biogeographic pattern. After all, Africa and Australia have not been in contact since the Early Cretaceous (<130 Ma), which is somewhat problematic, as 'the oldest possible age of bees…is the earliest part of the mid-Cretaceous, or about 125 Ma' (Engel 2001: 152). There are examples of insects found only in South Africa and Australia, such as the boganiid beetles (Endrödy-Younga & Crowson 1986). Perhaps the origin of bees is earlier in the Cretaceous than currently accepted, or the ancestral bees dispersed across the nascent Indian Ocean.

Alexander and Michener (1995) presented a major cladistic study on the 'short-tongued bees' based on adult morphological characters. The position of *Scrapter* in their cladograms varied, and no firm placement was favoured. It is, however, notable that *Scrapter* never emerged as sister-group of the two included euryglossine genera (*Euryglossa* Smith and *Euryglossula* Michener), or *Leioproctus* Smith, the paracolletine genus that *Scrapter* has phenotypic resemblances to. Under equal weights (Alexander & Michener 1995, fig. 5), the colletids (with the exclusion of the euryglossines that emerged as sister-group to all the bees) were largely unresolved as a polytomy, with *Scrapter* as sister to *Lonchopria* Vachal (but this is an unconvincing association). Under implied weights (Alexander & Michener 1995, fig. 6), *Scrapter* was the sister-group to a clade containing the Hylaeinae and Xeromelissinae. In turn, Euryglossinae was the sister-group to the clade *Scrapter* + Hylaeinae + Xeromelissinae. In light of the mixed results of Alexander and Michener's (1995) study, Michener (2000: 130) commented that 'it is clear that the Colletinae include diverse elements, but it is not yet clear how the classification should be changed. A needed first step is a phylogenetic study of the forms here placed in Colletinae, using representatives of many more taxa than were used in the Alexander and Michener study'.

Two new classifications of the bees have recently, almost simultaneously, been proposed (Engel 2005; Melo & Gonçalves 2005). Both papers addressed the uncertain position of *Scrapter*, and the paraphyletic nature of the Colletinae. Melo and Gonçalves (2005: 157) erected a new tribe to accommodate *Scrapter* (foreshadowed by Michener 2000: 130), but their new tribal name marginally failed to satisfy the requirements of Article 13.1–13.2 (ICZN 1999: 17, 18), and is nomenclaturally unavailable (Ascher & Engel pers. comm.). Engel (2005), in a thorough review of family-group nomenclature of bees, introduced several new higher-level taxa. Ascher and Engel (Engel 2005: 13, 14) proposed the new subfamily, Scraptrinae, with *Scrapter* as the only constituent genus, and issued a detailed diagnosis to distinguish the subfamily. They argued that the placement of *Scrapter* with the paracolletine bees had never 'been supported by any substantial apomorphic characters', and referred to an unpublished dissertation by Ascher that found *Scrapter* was the sister-group to a clade containing the Xeromelissinae + Euryglossinae + Hylaeinae—resembling the implied weights result of Alexander and Michener (1995: fig. 6).

According *Scrapter* a high categorical rank (be it at tribal or subfamily level) has the laudable merit of earmarking what appears to be a distinct colletid clade, and highlighting the unresolved relationships of the group. However, it is debatable whether such an action

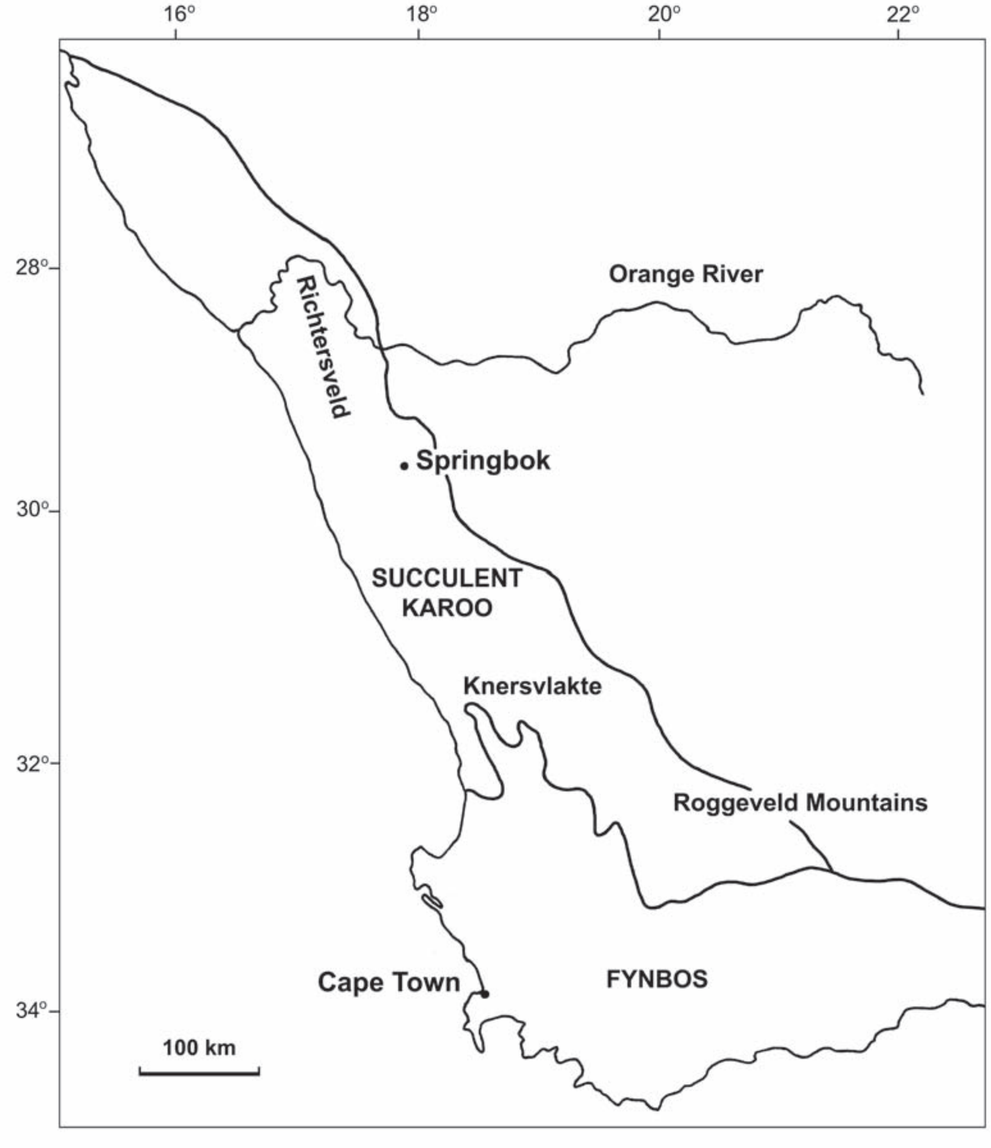


Fig. 1. Map of western South Africa showing the Succulent Karoo and Fynbos biomes, and several important localities mentioned in the text. The interdigitation of the two biomes has been greatly simplified in the map.

then renders other colletid taxa of co-ordinate rank paraphyletic. Neither Melo and Gonçalves (2005) nor Ascher and Engel (Engel 2005) assessed this possibility, although like other melittologists (e.g. Michener 2000: 71), they may not be opposed to the recognition of paraphyla. The systematics of the colletid bees is currently under intensive investigation at Cornell University, USA, and classifactory reorganisation of the colletid bees should probably be deferred until after the publication of these comprehensive studies. In the interim, we leave the *Scrapter incertae sedis* within the colletids.

Scrapter has its greatest diversity in the winter rainfall Succulent Karoo biome (Rutherford & Westfall 1994; Milton *et al.* 1997) of the western and northern Cape, South Africa (Fig. 1). The Succulent Karoo is an arid region (annual rainfall ranging from 20–290 mm), with an exceedingly rich and highly endemic flora (Cowling & Hilton-Taylor 1994; Milton *et al.* 1997; Van Wyk & Smith 2001), and approximately 40% of the described *Scrapter* species are endemic to it. The biome is also rich in other indigenous bees and anthophilous insects, such as the distinctive megachilid tribe Fideliini (Whitehead & Eardley 2003; Engel 2004), masarine wasps (e.g. Gess 1992), and bombyliid and vermileonid flies (e.g. Stuckenberg 2000; Greathead & Evenhuis 2001).

Despite the importance of the Succulent Karoo to indigenous bees and other insects, only about 2% of the biome is formally protected (Lombard *et al.* 1999). McGeoch (2002) observed that the 'identification of priority areas for [insect] conservation' was an important goal in South Africa. To date, no priority areas for indigenous, particularly endemic, bees in South Africa have been identified in the primary literature, although many significant areas are known to melittologists, especially in the Succulent Karoo. Given their importance in pollination of the indigenous flora, the identification of important bee areas in South Africa (especially the Succulent Karoo) is a significant task for the future.

Eardley (1996) provided the first comprehensive taxonomic revision of *Scrapter*, recognizing 11 new species and 31 species in total. Despite that thorough review, the procurement of further material (especially by Drs M. Kuhlmann and F.W. and S.K. Gess) has revealed the existence of a surprising number of undescribed species. These new taxa are described here, including the first confirmed record of the genus from East Africa. Furthermore, the females of *Scrapter amplispinatus* and *S. albifumus*, which were unknown at the time of Eardley's revision, have been discovered and are also described. The present paper brings the total number of valid *Scrapter* species to 39. The large number of new species strongly suggests that other undescribed species await collection and description.

MATERIAL AND METHODS

Pinned adult specimens were used in the study. Morphological terminology follows Michener (2000: 40–52) and Engel (2001: 19–33). The term *anterior face of supraclypeal area* has been used; this requires some explanation. In *Scrapter*, the supraclypeal area is usually raised, forming a bulbous, generally convex protuberance (Fig. 2). The side of the raised portion facing downwards or anteriorly (depending on the orientation of the head) is termed here the *anterior face of supraclypeal area*, and frequently has distinctive sculpture or patterning. In some *Scrapter* species, the supraclypeal area is flat and this term is not applicable.

In anterior view the ocellar triangle of certain *Scrapter* species is raised (Fig. 3a) forming a distinctive outline. This is described as *ocellar triangle raised in anterior profile*. When the ocellar triangle is not raised, the outline of the vertex is said to be *rounded in anterior profile* (Fig. 3b).

Bilaterally symmetrical structures are described in the singular. Abbreviations used: F – flagellomere, T – tergum and S – sternum. The term *carinulate*, in describing surface sculpture, refers to largely parallel, raised, longitudinal ridges

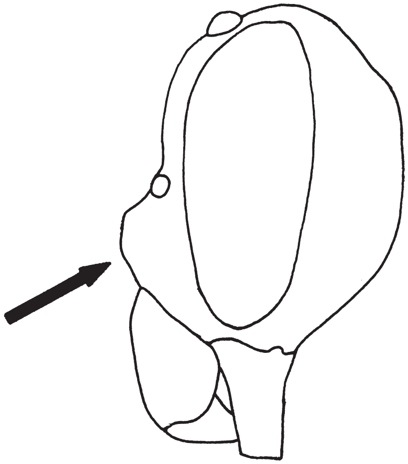


Fig. 2. Lateral view of diagrammatic *Scrapter* head showing bulbous supraclypeal area and anterior face of supraclypeal area (arrowed).

that are fairly densely packed together. In the species descriptions the term *terminalia* has been used broadly to include sterna 6–8 and the genitalia of the males. Male terminalia were removed from relaxed specimens, soaked in 10% KOH for approximately 24 hours to remove muscle and connective tissues, neutralised with dilute acetic acid and rinsed briefly in water. Terminalia were stored in polyethylene microvials attached to the pin of the specimen. Measurements largely follow the guidelines of Michener (2000, figs 10.3b, 10.8); where more than one specimen was measured, the mean is given.

Material examined was obtained from the following collections: Albany Museum, Grahamstown (AMGS); Michael Kuhlmann Private Collection, University of Muenster, Germany (MKPC); South African Museum, Cape Town (SAMC); and National Collection of Insects, Tshwane/Pretoria (SANC).

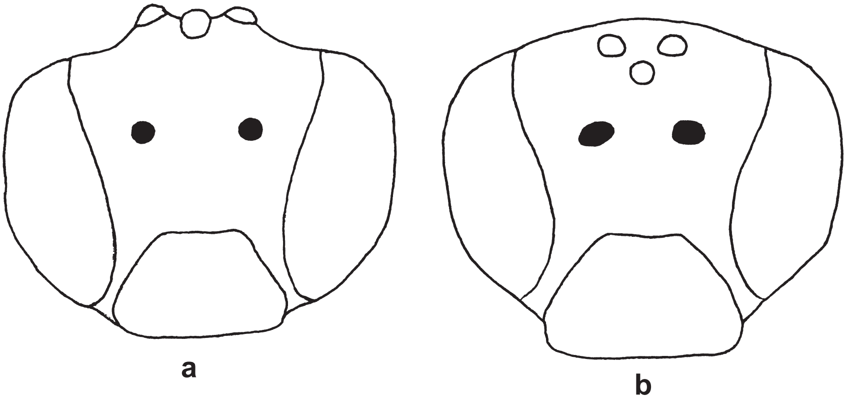


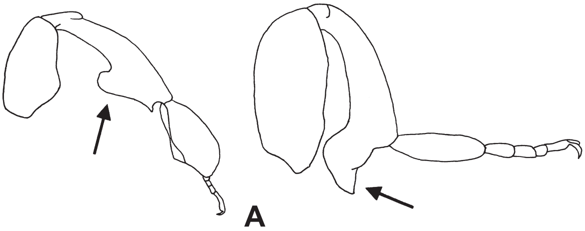
Fig. 3. Anterior view of diagrammatic *Scrapter* head showing (a) raised ocellar triangle and (b) rounded vertex.

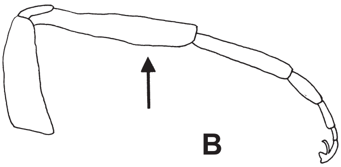
TAXONOMY

Revised key to the species of *Scrapter* (adapted from Eardley 1996)

1a. *Males*: antennal flagellum 11-segmented, no metatibial scopa 2
b. *Females*: antennal flagellum 10-segmented, scopa present on metatibia 38

2a. Metatibia tuberculate apically (Fig. A) 3
b. Metatibia not modified (Fig. B) 7





3a. Mesobasitarsus greatly swollen, yellow (resembling grotesque yellow balloon) .... *armatipes* (Friese)
b. Mesobasitarsus unmodified 4

4a. All tibiae and tarsi yellow to yellowish-orange, small bee (body length approximately 5 mm) .... *aureiferus* Cockerell
b. All tibiae and tarsi black, medium to large bee (body length approximately 7–14 mm) 5

5a. Metabasitarsus strongly swollen, vertex and frons carinulate .... *amplitarsus* (Friese)
b. Metabasitarsus not greatly swollen, vertex and frons not carinulate 6

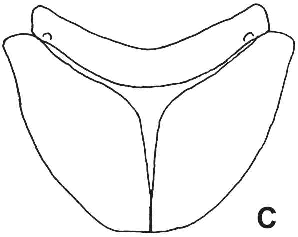
6a. Large (body length 9–14 mm), robust, very hirsute bee, metafemur strongly swollen .... *heterodoxus* (Cockerell)
b. Medium-sized (body length approximately 6.5 mm), elongate, moderately hirsute bee, metafemur not swollen .... **acanthophorus** sp. n.

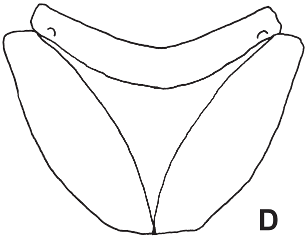
7a. T2–T5 almost completely covered in dense pubescent tomentum (as opposed to longer hairs) .... *caesariatus* Eardley
b. T2–T5 either without tomentum (may be otherwise hairy), or each tergite with basal tomentum only 8

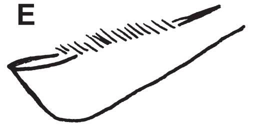
8a. S2 densely covered in fine, very thick vestiture throughout sternum, contrasting strongly with other sterna (found in savanna areas of northern South Africa and Zimbabwe) .... *absonus* Eardley
b. S2 bare to moderately hirsute (not strongly differentiated from other sterna) ... 9

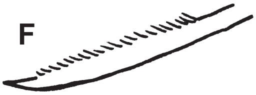
9a. Propodeal triangle greatly modified with central area much reduced, triangle forming three acute points (Fig. C) 10
b. Propodeal triangle not modified, forming rough equilateral triangle (Fig. D) 12

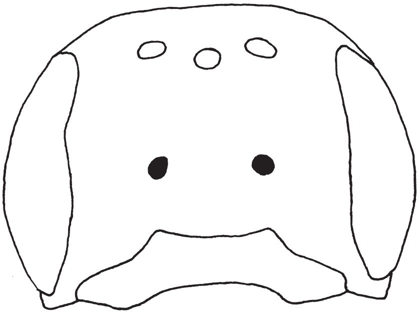
10a. Anterior (outer) metatibial spur strongly swollen (Fig. E), apical quarter of wing infuscated .... *amplispinatus* Eardley
b. Anterior (outer) metatibial spur not strongly swollen (Fig. F), entire wing hyaline 11

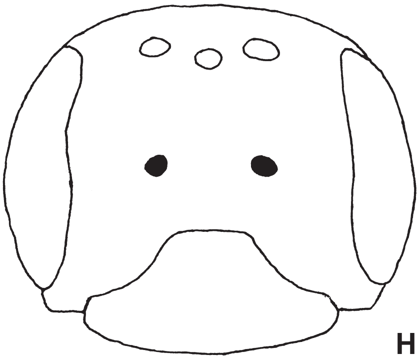

C


D


E


F


G


H

11a. Metasoma partly red, propodeum dark black but lacking swarthy, velvety vestiture .... *erubescens* (Friese)
b. Metasoma black, propodeum with velvety black vestiture ... *fuliginatus* Eardley

12a. Clypeus greatly reduced (concave ventrally) (Fig. G) .... *chloris* Eardley
b. Clypeus unmodified or, if somewhat reduced, scape is yellow (Fig. H) 13

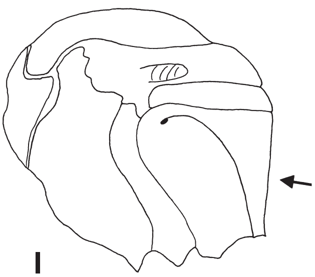
13a. Antennal scape yellow anteriorly .... *luridus* Eardley
b. Antennal scape black 14

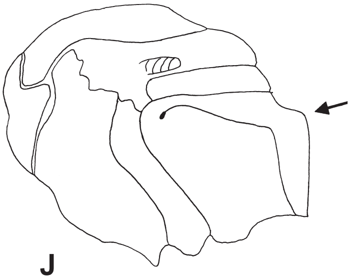
14a. Pronotal lobe yellow 15
b. Pronotal lobe black or red-brown 17

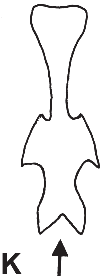
15a. Mesoscutum generally densely punctate (punctures mostly less than a puncture diameter apart), very finely sculptured between punctures, metasoma orangish to black .... *flavipes* (Friese)
b. Mesoscutum sparsely punctate (punctures mostly more than puncture diameter apart), smooth between punctures, metasoma black 16

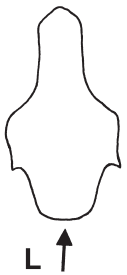
16a. Robust, fairly large bee (body length approximately 8–9 mm), metafemur partly yellow and metatibia completely yellow .... *basutorum* (Cockerell)
b. Small bee (body length approximately 5–5.5 mm), metafemur black and metatibia partly black .... *flavostictus* Cockerell

17a. Propodeum declivitous (vertical) (Fig. I) 18
b. Propodeum weakly to strongly angulate (weakly angulate propodeum requires careful discrimination) (Fig. J) 20


I


J


K


L

18a. Clypeus not bearing ventrolateral protuberances, facial fovea distinct, S8 bifurcate anteriorly (Fig. K) .... *capensis* (Friese)

b. Clypeus with ventrolateral projections, facial fovea weakly differentiated from surrounding integument, S8 rounded or pointed anteriorly (Fig. L) 19

19a. Metasoma black, mesosoma dorsum vestiture conspicuously orange-brown .... *thoracicus* (Friese)

b. Metasoma mostly orange-red, mesosoma dorsum vestiture whitish .... *bicolor* Lepeletier & Serville

20a. Mediolongitudinal sulcus present on clypeus (sulcus may be weakly defined, careful scrutiny is sometimes required) (Fig. M) 21

b. Mediolongitudinal sulcus absent on clypeus (Fig. N) 24

21a. S7 concave posteriorly (Fig. O), lacking posterolateral projections .... *pallidipennis* (Cockerell)

b. S7 very weakly concave posteriorly with posterolateral projections (Fig. P) .. 22

22a. Mesoscutum fairly densely punctate (interspace <1 × puncture diameter) .... *nitidus* (Friese)

b. Mesoscutum sparsely punctate (interspace >1 × puncture diameter) 23

23a. Antenna short (slightly longer than eye); notaulus and median line strongly impressed .... *ruficornis* (Cockerell)

b. Antenna long (about twice as long as eye), notaulus and median line weakly impressed .... *opacus* (Friese)

24a. Antenna ventrally yellow except for black apical part of F9 and all of F10, F11 (creating characteristic colour pattern) (Fig. Q) 25

b. Antenna ventrally all or mainly yellow, dorsally black (Fig. R), or all dark orange-brown 27

25a. Antenna exceedingly long reaching T3, mandibles largely yellow .... **chrysomastes** sp. n.

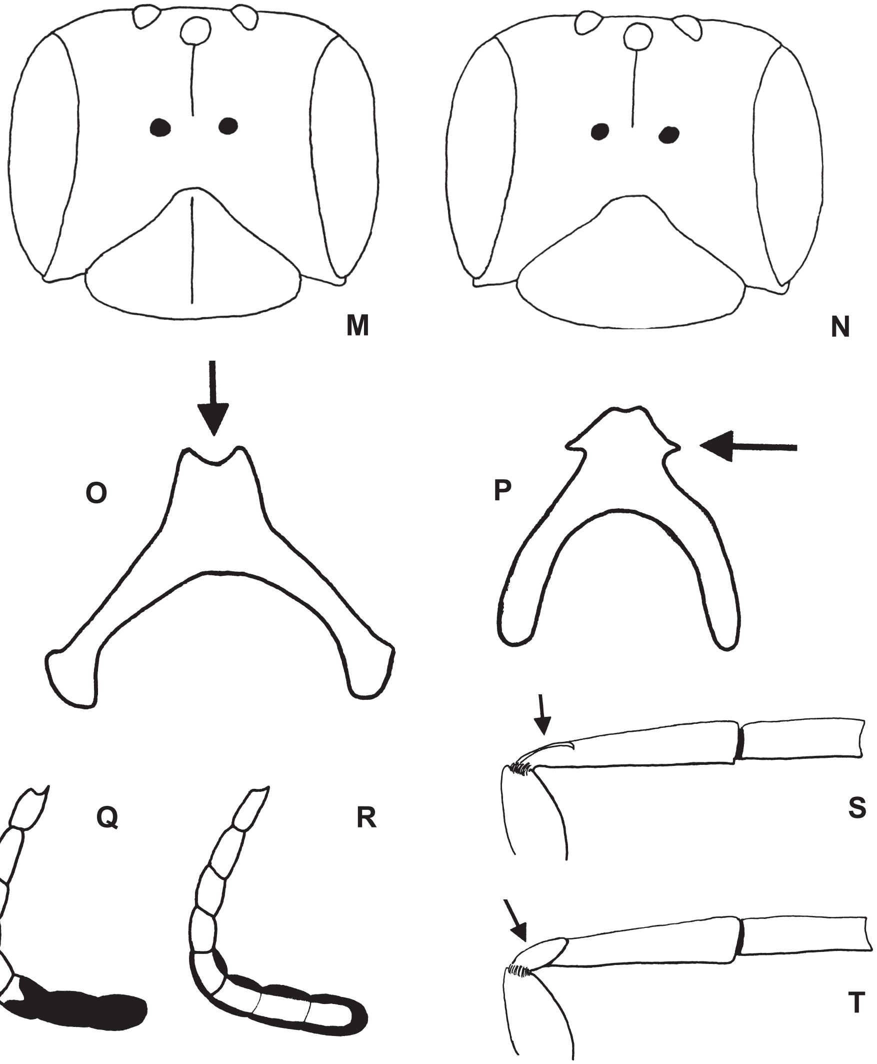
b. Antenna not extending beyond propodeum, mandibles all blackish 26

26a. S7 deeply concave posteriorly, S8 pointed anteriorly, tiny bee (body length <6.5 mm), dead specimens usually curl up on pin .... *albifumus* Eardley

b. S7 weakly concave posterioly, S8 rounded anteriorly, medium-sized bee (body length >6.5 mm), dead specimens do not curl up on pin .... *tomentum* Eardley

27a. Vertex and frons distinctly carinulate 28

b. Vertex and frons not carinulate 33



28a. S7 concave posteriorly 29
b. S7 posteriorly with single or two small, acute projections 32

29a. Clypeus strongly protuberant 30
b. Clypeus not (or weakly) protuberant 31

30a. Mesosomal hairs largely orange-brown .... **carysomus** sp. n.
b. Mesosomal hairs black .... **eremanthedon** sp. n.

31a. Metabasitibial plate not entire (only posterior carina) (Fig. S), meso- and metatibia dark (all tarsi may be yellow), dense mesoscutum punctation .... *niger* Lepeletier & Serville
b. Metabasitibial plate entire (Fig. T), all tibiae and tarsi yellow, sparse mesoscutum punctation .... **glarea** sp. n.

32a. S7 with single acute point posteriorly, facial fovea indistinct (poorly differentiated from surrounding integument) .... **oxyaspis** sp. n.
b. S7 with two tiny acute projections posteriorly, facial fovea shallow and broad (well differentiated from surrounding integument) .... *striatus* Smith

33a. Body length >6.5 mm .... *algoensis* (Friese)
b. Body length <6.5 mm 34

34a Mesoscutum integument finely reticulate .... *albitarsis* (Friese)
b. Mesoscutum integument smooth 35

35a. Propodeal triangle with rough reticulate sculpture medially 36
b. Propodeal triangle smooth and shiny medially 37

36a Metabasitibial plate entire, S7 strongly concave posteriorly with small, transparent, posterolateral, rounded projections ....**sittybon** sp. n.
b. Metabasitibial plate not entire (posterior carina only), S7 truncate posteriorly, no posterolateral projections .... *avius* Eardley

37a. Flagellomere 11 round apically (Fig. U) .... *calx* Eardley
b. Flagellomere 11 elongate and tapering to acute point (Fig. V) ...... **catoxys** sp. n.

38a. Propodeal triangle strongly incurved laterally, forming three acute points (Fig. C), or triangle difficult to distinguish from adjoining propodeum 39
b. Propodeal triangle not modified (triangular), distinct from propodeum (Fig. D) 42

39a. Mesoscutum smooth between punctures ....*amplitarsus* (Friese)
b. Mesoscutum reticulate or roughened between punctures 40

40a. Clypeus dull, facial fovea indistinct and difficult to discern....*fuliginatus* Eardley
b. Clypeus shiny, facial fovea distinct, broad and easily discernable 41

41a. Metasoma dull, rough, reticulate sculpture, metasoma all black .... *amplispinatus* Eardley
b. Metasoma shiny, finely reticulate sculpture, metasoma often partly reddish .... *erubescens* (Friese)

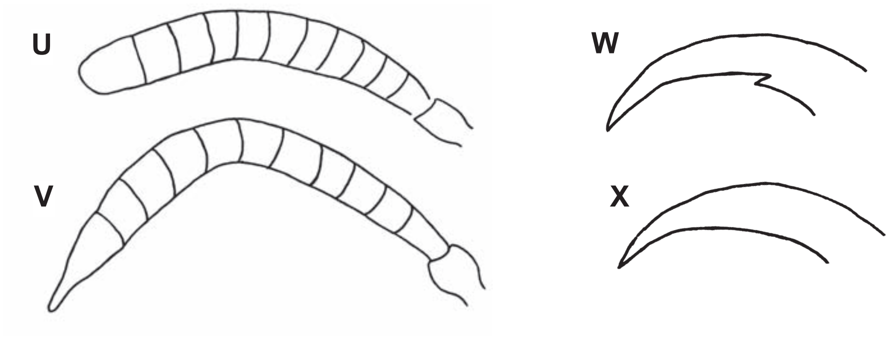
42a. Clypeus with mediolongitudinal sulcus (may be weakly developed) (Fig. M) 43
b. Clypeus without mediolongitudinal sulcus (Fig. N) 51

43a. Distinct posterior hair bands on marginal zones of terga…*heterodoxus* (Cockerell)
b. Terga without distinct posterior hair bands (very weak bands may be present).. 44

44a. Pronotal lobe yellow 45
b. Pronotal lobe black or blackish 46

45a. Mesoscutum punctation sparse (interspace >2 × puncture diameter), facial fovea broad and shallow ....*basutorum* (Cockerell)
b. Mesoscutum punctation very dense (interspace approximately 0.5–1 × puncture diameter, facial fovea rather narrow .... *flavipes* (Friese)

46a. Clypeus distinctly protuberant... *caesariatus* Eardley
b. Clypeus not protuberant 47



47a. Clypeus with small tubercle medioventrally, metabasitibial plate edges reduced to small tubercles .... *niger* Lepeletier & Serville
b. Clypeus with medioventral edge unmodified, metabasitibial plate entire or comprised of distinct carinae 48

48a. Mesoscutal punctation usually fairly dense (interspace <1 × puncture diameter), integument of metasoma completely black or black and reddish, metatibial scopa usually white anteriorly and infuscated dorso-posteriorly ....*nitidus* (Friese)
b. Mesoscutal punctation sparse (interspace >1 × puncture diameter), integument of metasoma black, metatibial scopa usually black or white (white scopa may be lightly infuscated posteriorly) 49

49a. Metatibial scopa black, vestiture on T5–T6 black........... *ruficornis* (Cockerell)
b. Metatibial scopa white, vestiture on T5–T6 white 50

50a. Medial region of propodeal triangle smooth .... *opacus* (Friese)
b. Medial region of propodeal triangle with carinae ....*pallidipennis* (Cockerell)

51a. Metasoma largely reddish... 52
b. Metasoma black or blackish 57

52a. Metatibial scopa all black, facial fovea broad and shallow ....*bicolor* Lepeletier & Serville
b. Metatibial scopa all white or white with dark ridge dorso-posteriorly, fovea narrow or narrowish 53

53a. Mesoscutum with roughened sculpture between punctures 54
b. Mesoscutum smooth between punctures (may be finely reticulate, but not roughened) 55

54a. Metatibial scopa white, prepygidial fimbria white...................... *luridus* Eardley
b. Metatibial scopa white anteriorly, infuscated dorso-posteriorly, prepygidial fimbria black .... *chloris* Eardley

55a. Mesoscutum largely punctureless, metabasitibial plate entire and very hairy .... *calx* Eardley
b. Mesoscutal punctation fairly dense to dense, metabasitibial plate not entire (tubercles or weak carinae) 56

56a. Body length approximately 8–8.5 mm, brownish vestiture on mesosoma dorsum .... *whiteheadi* Eardley

b. Body length approximately 4.5–6 mm, whitish vestiture on mesosoma dorsum .... *avius* Eardley

57a. Ventral margin of clypeus strongly concave, with distinct ventrolateral projections .... *thoracicus* (Friese)

b. Ventral margin of clypeus slightly or not concave, no ventrolateral projections 58

58a. Mesoscutum smooth between punctures 59

b. Mesoscutum finely reticulate or leathery (coriaceous) between punctures 67

59a. Claws with basal tooth (careful scrutiny sometimes required) (Fig. W) 60

b. Claws simple (Fig. X) 62

60a. Basal tomentum along graduli of T2–T5 .... *tomentum* Eardley

b. No basal tomentum on terga 61

61a. Frons smooth between punctures, sculpture in facial fovea smooth .... *capensis* (Friese)

b. Frons carinulate between punctures, sculpture in facial fovea finely reticulate .... *leonis* Cockerell

62a. Wings infuscated .... *armatipes* (Friese)

b. Wings hyaline 63

63a. Metabasitibial plate entire (Fig. T) 64

b. Metabasitibial plate not entire (with posterior carina only, or lanceolate blades) 66

64a. Pronotal lobe yellow .... *flavostictus* Cockerell

b. Pronotal lobe black 65

65a. Mesoscutum with very sparse punctation .... *calx* Eardley

b. Mesoscutum with fairly dense punctation .... **catoxys** sp. n.

66a. Metabasitibial plate comprised of two broad, lanceolate blades and 2–3 apical tubercles, body length >7.5 mm .... *striatus* Smith

b. Metabasitibial plate consisting of posterior carina only, body length <6 mm .... *aureiferus* Cockerell

67a. Strong posterior white hair bands on marginal zones of T1–T4 .... *albifumus* Eardley

b. No hair bands along tergal marginal zones 68

68a. Antenna almost completely orange (virtually no black colouring), mesoscutum with fairly dense punctation (interspace approximately 1–1.5 × puncture diameter), restricted to savanna areas in northern South Africa and Zimbabwe .... *absonus* Eardley

b. Antenna orange ventrally, black dorsally, mesoscutum with sparse punctation (interspace >2 × puncture diameter), found in Succulent Karoo and Fynbos of western South Africa 69

69a. Claws toothed, metabasitibial plate not entire consisting of anterior and posterior carinae, posterior carina tuberculate apically .... **eremanthedon** sp. n.

b. Claws simple, metabasitibial plate entire .... *albitarsis* (Friese)

Scrapter acanthophorus Davies, sp. n.

Figs 4–8

Etymology: Gr. *akantha* (thorn); Gr. *phero* (bearer, carrier). In allusion to the distinctive spurred metatibia (Fig. 4).

Holotype ♂: SOUTH AFRICA: *Western Cape*: 30 km north of Vanrhynsdorp (31°22'23"S:18°42'37"E), Knersvlakte, 146 m, 6.ix.2003, K. Timmermann (SANC). Paratypes: 17 ♂ collected from the same locality, between 5–11.ix.2003 (MKPC).

Description:

Male.

Measurements ($n = 3$): head length 1.3 mm, head width 1.7 mm, lower interocular distance 0.9 mm, upper interocular distance 1.1 mm, interantennal distance 0.3 mm, antennocular distance 0.2 mm, length of clypeus 0.4 mm, length of eye 1 mm, width of eye (lateral view) 0.5 mm, width of gena (lateral view) 0.2 mm, length of facial fovea 0.2 mm, maximum width of facial fovea 0.03 mm, mesoscutum length 1 mm, mesosoma length 1.6 mm, forewing length 4.2 mm, length of pterostigma 0.7 mm, maximum width of pterostigma 0.2 mm, length of marginal cell beyond pterostigma 0.9 mm, length of marginal cell 1.1 mm, length of free-part of marginal cell 0.8 mm.

Vestiture: Clypeus and lower paraocular area with thick, decumbent, bristly, white, hairs (underlying integument obscured). Remainder of paraocular area, frons, scape and vertex with erect, sparse, greyish, plumose hairs. Gena with sparse, white, plumose

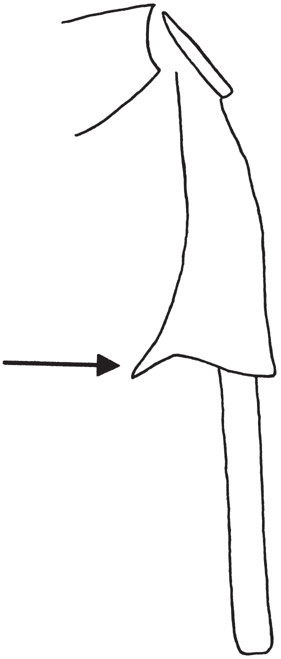
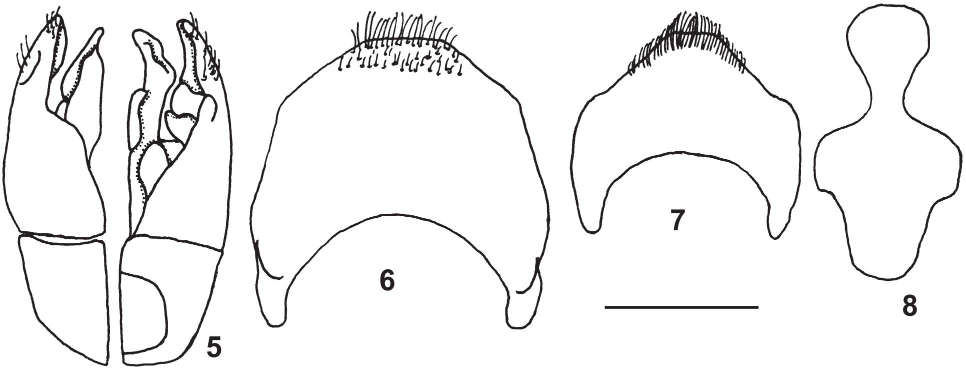


Fig. 4. *Scrapter acanthophorus* sp. n., distinctive spurred metatibia (arrowed).



Figs 5–8. *Scrapter acanthophorus* sp. n., terminalia: (5) genitalia (dorsal and ventral views), (6–8) S6–S8. Scale bar = 0.4 mm.

hairs. Mesoscutum, scutellum and metanotum covered in sparse, erect, shortish, whitish, plumose hairs (integument easily visible). Mes- and metepisterna with long, sparse, white, plumose hairs. T2–T5 with bands of white tomentum along graduli. Sterna largely hairless, S4 and S5 with very weak posterior hair bands, S6 with weak posterior brush of yellowish hairs on apical point of sternum.

Integumental colour: Mainly black. Anterior part of protibia and extreme apical end of profemur yellow. Extreme apical end of mesofemur yellow. Antenna ventrally yellow.

Head: Clypeus smooth (except dorsally where finely reticulate) with dense punctation (interspace <0.5 × puncture diameter), no clypeal sulcus. Supraclypeal area weakly raised, anterior face of supraclypeal area with weakly reticulated surface and rather sparse punctation (interspace approximately 1.5 × puncture diameter). Frontal line carinate. Frons and paraocular area with dense punctation. Facial fovea sulcoid. Ocellar triangle raised in anterior profile. Gena narrower than eye (0.4:1), with heavy punctation and reticulate sculpture. Inner eye orbits diverging dorsally, proportion of lower to upper interocular distance 0.8:1. F1 not elongate. Antenna short, barely reaching tegula.

Mesosoma: Mesoscutum, scutellum and metanotum with fairly dense to dense punctation (interspace 0.5–1 × puncture diameter), interspaces shiny and very finely reticulate, median line fairly broad but not deeply impressed, notaulus very weak. Mes- and metepisterna with dense punctation and reticulate interspaces. Propodeum strongly angulate, with dense punctation and rough, reticulate sculpture, propodeal triangle with uniform, rugose sculpture and weak anterior carinae on basal area, margins of triangle pitted.

Metasoma: Tergal discs with finely reticulate sculpture and evenly punctate (interspace 0.5–1 × puncture diameter). T2 fovea elongate ovoid.

Terminalia: Gonobase large, gonoforceps rather narrow, laterally concave, hairy (>30 golden hairs), ventrally with transparent membrane, penis valves large, prominent and outer margin ridged (Fig. 5). S6 broadly rounded and hairy posteriorly, anteriorly weakly concave (Fig. 6). S7 weakly concave posteriorly, inconspicuous pointed lateral processes bearing tiny tuft of hair (Fig. 7). S8 posteriorly rounded, posterior region short, very weakly hairy (Fig. 8).

Legs: Metabasitibial plate entire. Claws deeply cleft. Metatibia with pronounced posterior spur (Fig. 4).

Female. Unknown.

Diagnosis: *S. acanthophorus* runs to *S. albitarsis* (Friese) in Eardley's (1996) key, but is substantially larger with much denser scutal punctation and different terminalia (see Eardley 1996, figs 24–26), e.g. *S. acanthophorus* lacks the posterolateral prominences of the S7 found in *S. albitarsis* (Eardley 1996, fig. 24). Further, *S. albitarsis* lacks the black spur on the metatibia characteristic of *S. acanthophorus* (Fig. 4). Several other *Scrapter* species have males with armed hind legs, but they differ substantially from *S. acanthophorus* in general facies. *S. heterodoxus* (Cockerell) is a large, extremely hairy bee, easily distinguished by its strongly swollen metafemur and different terminalia (see Eardley 1996, figs 46–49). *S. armatipes* (Friese) and *S. amplitarsus* (Friese) both differ from *S. acanthophorus* in having swollen metabasitarsi, and in terminalia structure (see Eardley 1996, figs 100–107). *S. aureiferus* Cockerell is a tiny bee (body length 5–6 mm) with bright yellow legs, quite different from *S. acanthophorus*. Finally, *S. acanthophorus* has features suggestive of the *S. nitidus* complex (e.g. raised ocellar triangle, slit-like facial fovea, entire metabasitibial plate and basal pubescence along graduli on T2–T4), but the reticulate mesoscutum, lack of a clypeal sulcus, propodeal triangle largely devoid of carinae and spurred metatibiae easily distinguishes *S. acanthophorus*.

Distribution: Only known from the Knersvlakte, near Vanrhynsdorp, Western Cape. The Knersvlakte is a remarkable region framed in the east by the Bokkeveld Mountains and in the west by the coastal Strandveld. The landscape is one of low rounded hills and lightly undulating flats, covered in many areas with white quartz gravel and pebble fields, that give the area a distinctive appearance. The vegetation is sparse, low, dominated by succulents and rich in endemics (Van Wyk & Smith 2001: 52–57). Little is known about the general insect fauna of the Knersvlakte, but endemic flies include the uncommon vermileonid *Leptynoma namaquaensis* (Stuckenberg) and empidid *Edenophorus simplex* Sinclair (Stuckenberg 1996; Sinclair 2002). Furthermore, no less than four *Scrapter* species appear endemic to this region, viz. *S. acanthophorus* sp. n., *S. calx* Eardley, *S. glarea* sp. n. and *S. sittybon* sp. n. This apparent locus of *Scrapter* endemism may be an artifact of collection, and further collecting may show that these *Scrapter* species have a wider distribution.

Biology: All specimens have been collected in early September. Several of the paratypes were collected in yellow pan traps. No data on the flower preferences of this species is available.

Scrapter carysomus Davies, sp. n.

Figs 9–12

Etymology: Gr. *karykrous* (nut-brown); Gr. *soma* (body). In reference to the orangish-brown vestiture covering the mesosoma.

Holotype ♂: SOUTH AFRICA: *Northern Cape*: Nieuwoudtville, Farm Glen Lyon (31°24'03"S:19°08'04"E), 700 m, 30.viii.2003, M. Kuhlmann (SANC). Paratypes: 4 ♂ from type locality and Nieuwoudtville Flower Reserve collected between 27.viii.2003 and 7.ix.2003 (MKPC).

Description:

Male.

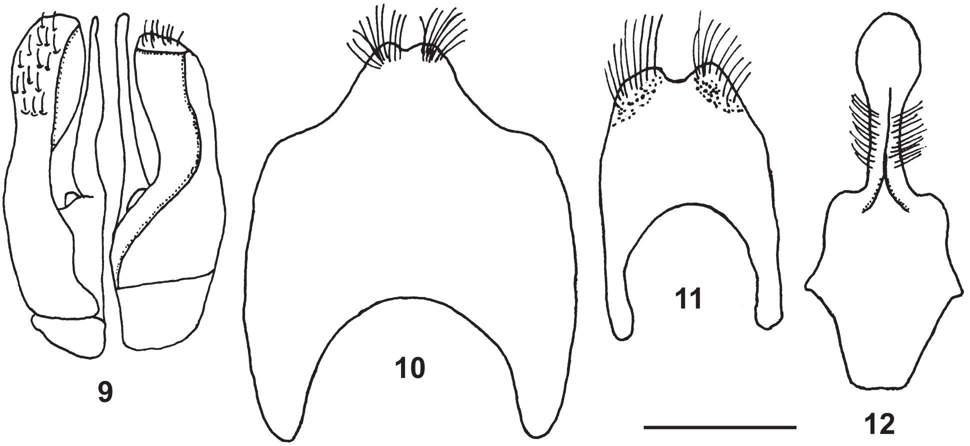
Measurements (*n* = 1): head length 2 mm, head width 2.3 mm, lower interocular distance 1.6 mm, upper interocular distance 1.6 mm, interantennal distance 0.6 mm, antennocular distance 0.4 mm, length of clypeus 1.8 mm, length of eye 1.5 mm, width of eye (lateral view) 0.5 mm, width of gena (lateral view) 0.6 mm, length of facial fovea 0.4 mm, maximum width of facial fovea 0.1 mm, mesoscutum length 1.3 mm, mesosoma length 2.5 mm, forewing length 6.3 mm, length of pterostigma 1 mm, maximum width of pterostigma 0.2 mm, length of marginal cell beyond pterostigma 0.8 mm, length of marginal cell 1 mm, length of free-part of marginal cell 0.6 mm.

Vestiture: Generally appears orange-brown when viewed with light microscope. Clypeus with long, white, rather thick, appressed hairs. Supraclypeal area, frons, paraocular area and gena sparse (integument easily visible), greyish, erect hairs. Scape hairs white, long, erect and weakly plumose. Vertex with sparse, yellow-brown, erect hairs. Mesoscutum, scutellum and metanotum with sparse (integument easily visible), yellow-brown or orange-brown, erect, weakly plumose hairs. Mes- and metepisternum with sparse, weakly plumose, yellow-white hairs. Propodeum densely covered (integument obscured) with thick, strongly plumose, erect hairs. T1–T5 with short, sparse, inconspicuous white hairs on tergal discs, laterally terga with longer white hairs; no posterior hair bands on tergal premarginal lines; visible part of T6 disc covered in stout, sub-erect, plumose, black hairs. S1 covered throughout in longish, white hairs. S2–S6 with sparse, white hairs and weak, posterior, white bands.

Integumental colour: Mainly black. Orange-brown patch on anterior side of protibia. Medio- and distitarsus of all legs dark yellow-orange. F1 entirely black, F2–F11 dorsally black, ventrally yellow-orange, ventral yellow-orange colouring increases in size from tiny dot on F2 to + of flagellomere on F11.

Head: Head robust and 'box-shaped'. Clypeus with dense punctation (interspace 0.5–1 × puncture diameter) and finely reticulate sculpture, no clypeal sulcus. Clypeus and supraclypeal area protuberant. Supraclypeal area anterior face generally smooth, shiny and punctureless (small band of fine reticulation ventrally). Paraocular area, frons and vertex with fairly dense punctation (interspace 0.5–1 × puncture diameter). Upper paraocular area, frons and vertex conspicuously carinulate. Frontal line very weak, almost absent. Facial fovea shiny, shallow, ovoid and easily discernable from surrounding integument. Inner eye orbits straight, proportion of lower to upper interocular distance equal. Gena with fairly dense punctation (interspace 0.5–1 × puncture diameter) and carinulate, eye slightly narrower than gena (0.8:1). Vertex rounded in anterior profile. F1 elongate. Antenna rather short, reaching tegula.

Mesosoma: Mesoscutum with reticulate sculpture and sparse punctation (interspace 1–2 × puncture diameter), median line and notaulus shallowly impressed. Scutellum sculpture similar to mesoscutum, but punctation denser. Metanotum with very dense punctation (interspace <0.5 × puncture diameter). Mes- and metepisterna with rough, reticulate surface, almost carinulate over mesepisternum, episternal groove straight, broadly pitted throughout. Propodeum weakly angulate with coarse, velvety black integument, propodeal triangle with irregular carinae on basal area, rugose sculpture



Figs 9–12. *Scrapter carysomus* sp. n., terminalia: (9) genitalia (dorsal and ventral views), (10–12) S6–S8. Scale bar = 0.4 mm.

between carinae, posteriorly rugose, reticulate pattern, margins of triangle indistinctly pitted.

Metasoma: Tergal discs with finely reticulate sculpture and sparse punctation (interspace >1.5 × puncture diameter). T2 fovea ovoid.

Terminalia: Gonoforceps narrowish, tapering posteriorly, hairy, ventrally with transparent membrane, penis valves long and narrow (Fig. 9). S6 medio-posteriorly extended with rear margin slightly concave and hairy, anteriorly strongly concave (Fig. 10). S7 concave and hairy posteriorly (hairs yellow, plumose) (Fig. 11). S8 not very hairy, few whitish plumose hairs, sub-truncate anteriorly (Fig. 12).

Legs: Metabasitibial plate entire. Claws deeply cleft.

Female. Unknown.

Diagnosis: *S. carysomus* is a medium-sized black bee with noticeable orange-brown mesosomal vestiture and protuberant clypeus. *S. carysomus* is also characterised by its entire metabasitibial plate, reticulate mesoscutum, lack of a clypeal sulcus, punctureless anterior face of supraclypeal area, carinulate vertex and frons. In Eardley's (1996) key, *S. carysomus* exits at *S. niger*, however, *S. carysomus* differs from *S. niger* in the deeper concave posterior margin to S7, straighter inner margin to gonocoxite, shorter posterior process to S8, elongate F1, entire metabasitibial plate, slightly shorter wing, and orange-brown (versus pale yellowish) mesosomal vestiture. These are subtle differences, but collectively they argue for a new species. *S. carysomus* is also very similar to *S. capensis*, particularly in the brownish mesosomal vestiture, but differs (1) in the shape of S8, lacking the deep cleft anteriorly in the disc of *S. capensis* (see Eardley 1996, fig. 96), (2) by lacking the coarsely reticulate mesoscutum of *S. capensis*, (3) by having a protuberant clypeus, (4) in having a weakly angulate propodeum and (5) in having very different vestiture on S2, S3, lacking the short, plumose hairs characteristic of *S. capensis*.

Distribution: Only known from the Nieuwoudtville area, Northern Cape (Succulent Karoo biome).

Biology: Specimens have been collected in Renosterveld from late August to early September, suggestive of an early spring bee. Renosterveld is a fynbos-like shrubland growing on clay-rich soils, and is characterised by the renosterbos (= rhinoceros bush) *Elytropappus rhinocerotis* (L.f.) Less. (Asteraceae). One of the paratypes was collected on an *Oxalis* species (Oxalidaceae).

Scrapter catoxys Davies, sp. n.

Figs 13–17

Etymology: Gr. *katoxys* (very sharp). In reference to the acute, tapering final black flagellomere of the male antenna (Fig. V in key).

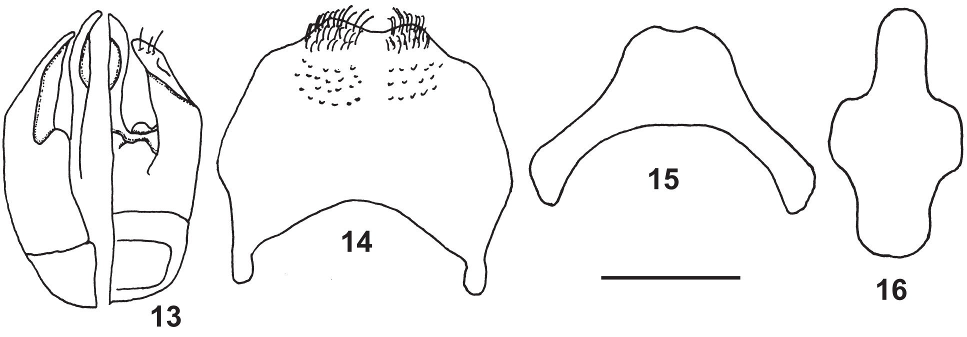
Holotype ♂: SOUTH AFRICA: *Northern Cape*: Springbok, Goegap Nature Reserve, hills, 8–10.ix.1992, F.W. and S.K. Gess (AMGS). Paratypes: 2 ♂ with same label data as holotype. Additional material: 3 ♂ and 2 ♀ with same label information as holotype.

Description:

Male.

Measurements (*n* = 3): head length 1.3 mm, head width 1.9 mm, lower interocular distance 0.9 mm, upper interocular distance 1.2 mm, interantennal distance 0.3 mm, antennocular distance 0.3 mm, length of clypeus 0.4 mm, length of eye 1 mm, width of eye (lateral view) 0.6 mm, width of gena (lateral view) 0.2 mm, length of facial fovea 0.3 mm, maximum width of facial fovea 0.06 mm, mesoscutum length 1.2 mm, mesosoma length 2 mm, forewing length 4.3 mm, length of pterostigma 0.6 mm, maximum width of pterostigma 0.1 mm, length of marginal cell beyond pterostigma 1 mm, length of marginal cell 1.2 mm, length of free-part of marginal cell 0.8 mm.

Vestiture: Hairy bee. Clypeus, supraclypeal area and lower paraocular area with thick, white, decumbent vestiture. Frons and upper paraocular area with erect, thick, white hairs. Scape with sparse, white hairs. Vertex with sparse, greyish, erect hairs. Gena with short, fairly dense, slightly decumbent, white hairs. Mesoscutum, scutellum and metanotum with sparse, erect, white hairs. Mes- and metepisterna with thick, long,



Figs 13–16. *Scrapter catoxys* sp. n., terminalia: (13) genitalia (dorsal and ventral views), (14–16) S6–S8. Scale bar = 0.4 mm.

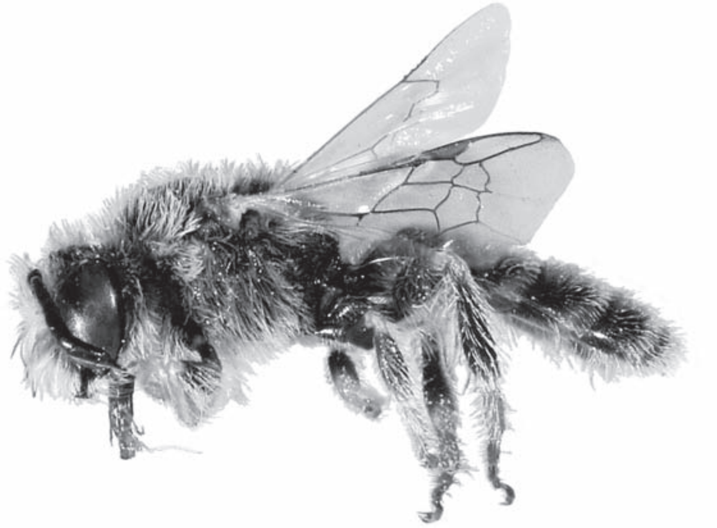


Fig. 17. *Scrapter catoxys* sp. n., lateral view of male.

white hairs. Propodeum with fairly dense, white hairs. Tergal discs with uniform, thick (although integument visible), short, white pubescence. T1–T4 with weak posterior, white, hair bands along marginal zone. S1 with scattered, inconspicuous white hairs. S2–S4 very weak, white, posterior hair bands.

Integumental colour: Mainly black. Protarsus, protibia and apical end of profemur yellow. Mesotarsus, proximal and apical ends of mesotibia and apical end of mesofemur yellow-orange. Metatarsus, proximal and apical ends of metatibia and apical end of metafemur orange-brown.

Head: Clypeus shiny and smooth with heavy punctation (interspace <0.5 × puncture diameter), no clypeal sulcus. Supraclypeal area, frons and paraocular area with dense punctation (interspace <0.5 × puncture diameter). Facial fovea sulcoid, elliptical, shiny and smooth. Gena much narrower than eye (0.3:1) with fairly dense punctation. Frontal line weakly carinate. Ocellar triangle raised in anterior profile. Inner eye orbits diverging above, proportion of lower to upper interocular distance 0.8:1. F11 very distinctive, tapering to fine point (Fig. V in key), antenna moderately long reaching metanotum.

Mesosoma: Mesoscutum smooth and shiny with fairly dense punctation (interspace 0.5–1 × puncture diameter), median line weakly impressed, notaulus very weak. Mes- and metepisterna shiny and smooth with heavy punctation (interspace 0.5 × puncture diameter), episternal groove pitted throughout. Propodeum angulate and heavily punctate, propodeal triangle shiny, largely smooth with several longitudinal carinae on basal area (weakly or irregularly developed in some specimens), margins of triangle weakly pitted.

Metasoma: Tergal discs smooth and shiny with fairly dense micropunctation. T2 fovea elongate ovoid.

Terminalia: Gonobase large, gonoforceps curved inwards posteriorly, ventrally membraneous, penis valves narrow, curved inwards (Fig. 13). S6 weakly concave and hairy posteriorly, weakly concave anteriorly (Fig. 14). S7 essentially truncate posteriorly except for two very small, black, blunt projections (Fig. 15). S8 posterior disc region short, anteriorly round (Fig. 16).

Legs: Metabasitibial plate near-entire. Claws unusual, pro- and mesopretarsal claws deeply bifid but metapretarsal claws weakly toothed. Metabasitarsus elongate.

Female.

Measurements ($n = 1$): head length 1.4 mm, head width 1.9 mm, lower interocular distance 1.2 mm, upper interocular distance 1.3 mm, interantennal distance 0.3 mm, antennocular distance 0.4 mm, length of clypeus 0.5 mm, length of eye 1 mm, width of eye (lateral view) 0.6 mm, width of gena (lateral view) 0.3 mm, length of facial fovea 0.2 mm, maximum width of facial fovea 0.08 mm, mesoscutum length 1.2 mm, mesosoma length 2 mm, forewing length 4.2 mm, length of pterostigma 0.6 mm, maximum width of pterostigma 0.2 mm, length of marginal cell beyond pterostigma 1 mm, length of marginal cell 1.2 mm, length of free part of marginal cell 0.8 mm.

Vestiture: Clypeus sparse, white, bristly hairs. White, bristly, fairly long, rather dense hairs surrounding antennal sockets. Remainder of face sparsely hairy (hairs on vertex with slight gold tinge). Gena rather sparse, white, bristly hairs. Mesoscutum sparse, short, white hairs, pilosity somewhat thicker on scutellum and metanotum. Sides of mesosoma with rather sparse, white, bristly, long hairs. Terga sparse, inconspicuous, white hairs throughout disc and weak band of short, white hairs along marginal zone. Prepygidial fimbria thick, white, bristly hairs. Probasitarsus anteriorly with white, bristly, long hairs; posteriorly with brush of short, dense, golden hairs. Metatibial scopa completely white. S2 with long, white, plumose hairs; S3 thickish band of plumose, white hairs posteriorly; remaining sterna with scattered, short hairs.

Integumental colour: Mainly black. Protarsus and protibia yellow-orange; mesotibia proximally yellow; terga with brownish tinge.

Head: Clypeus sparsely punctate (interspace approximately 2 × puncture diameter), interspaces smooth and shiny. Facial fovea short, shallow ovoid. Supraclypeal area raised, sparsely punctate. Frons and paraocular area densely punctate (interspace <0.5 × puncture diameter). Frons and vertex not carinulate. Ocellar triangle raised in anterior profile. Gena smooth and fairly densely punctate. Antenna short, barely reaching tegula. F10 weakly pointed.

Mesosoma: Mesoscutum with dense punctation (interspace <0.5 × puncture diameter), interspaces smooth and shiny. Scutellum similar to mesoscutum, but punctation sparse anteriorly. Metanotum with dense punctation. Propodeum angulate; propodeal triangle strikingly smooth and shiny, a few short carinae on basal area. Sides of mesosoma with dense punctation (interspace <0.5 × puncture diameter), interspaces smooth and shiny. Episternal groove pitted throughout.

Metasoma: Terga smooth with fairly dense punctation (interspace approximately 1 × puncture diameter). T2 fovea elongate ovoid.

Legs: Metabasitibial plate entire, hairy. Claws simple.

Diagnosis: *S. catoxys* is a small, shiny, hairy, black bee (Fig. 17); the metasomal tergal discs are noticeably covered throughout in fairly thick, white vestiture. Superficially, it resembles other hylaeiform *Scrapter* species, but the acutely pointed F11 is distinctive

(Fig. V in key). In particular, *S. catoxys* resembles *S. calx*, but the colouration and structure of the antennae are different, the acute F11 being especially diagnostic of *S. catoxys*. Further, the gonostylus of *S. catoxys* lacks an expanded inner margin (present in *S. calx*), the S7 of *S. catoxys* lacks posterolateral processes (present in *S. calx*) and the metadistitarsi are elongate (not elongate in *S. calx*). The ranges of *S. calx* and *S. catoxys* also appear allopatric (*S. calx* is seemingly largely circumscribed to the Knersvlakte).

Distribution: Only known from Goegap Nature Reserve, approximately 12 km east of Springbok (Succulent Karoo biome).

Biology: Flight period is during September. The type series was collected on *Cotula barbata* DC. (Asteraceae), which is a small, wiry annual bearing yellow, umbel-shaped flowers and is widespread in Namaqualand.

Scrapter chrysomastes Davies, sp. n.

Figs 18–22

Etymology: Gr. *chryso* (gold); Gr. *mastix* (whip). In reference to the diagnostic, largely yellow, remarkably long, whip-like antennae (Fig. 22).

Holotype ♂: SOUTH AFRICA: *Northern Cape*: Richtersveld National Park, between hills at 28°08'S:17°01'E, northwest of Koeroegabvlakte, 14.ix.1996, F.W., S.K. and R.W. Gess (AMGS). Paratypes: 3 ♂, same label data as holotype (AMGS).

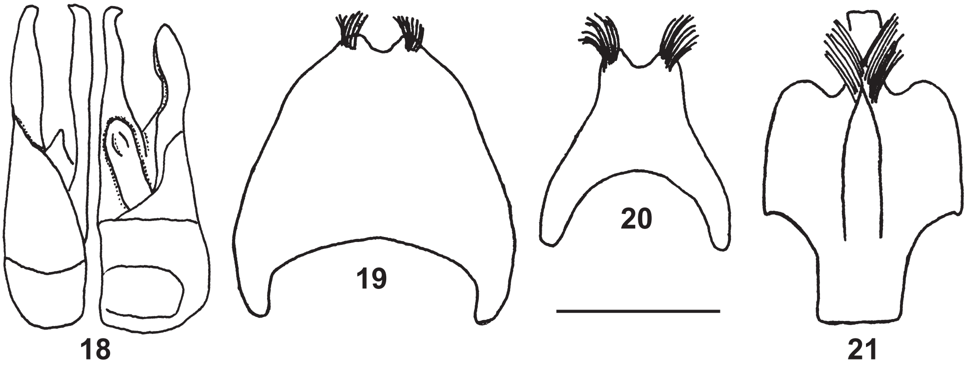
Description:

Male.

Measurements ($n = 1$): head length 1.3 mm, head width 1.6 mm, lower interocular distance 1 mm, upper interocular distance 1 mm, interantennal distance 0.3 mm, antennocular distance 0.3 mm, length of clypeus 0.4 mm, length of eye 0.5 mm, length of facial fovea 0.3 mm, maximum width of facial fovea 0.03 mm, width of eye (lateral view) 0.5 mm, width of gena (lateral view) 0.3 mm, mesoscutum length 1.1 mm, mesosoma length 2 mm, forewing length 4.2 mm, length of pterostigma 0.6 mm, maximum width of pterostigma 0.2 mm, length of marginal cell beyond pterostigma 1 mm, length of marginal cell 1.1 mm, length of free part of marginal cell 0.6 mm.

Vestiture: Overall, rather sparse, bright white vestiture including white metasomal hairbands. Clypeus with thick, short, starkly white, decumbent hairs. Supraclypeal area, frons and lower paraocular area with short, erect, white hairs. Scape hairs white and bristly. Vertex with sparse, erect, long, whitish hairs. Gena with white, fairly dense hairs. Mesoscutum with very sparse, erect, white vestiture. Scutellum and metanotum covered in sparse, white hairs. Mesepisternum with sparse, white hairs. Mesosoma ventrally with thick, white, decumbent vestiture. Propodeum with sparse, white vestiture. Tergal discs with very sparse, erect, white hairs. T1–T4 with decumbent, white hair bands along marginal zones (hair bands easily discernable with naked eye). T5 with very weak hair band. S2 with long, shaggy, fairly sparse, white hairs. S3–S6 hairiness declines progressively, S5 and S6 mostly hairless.

Integumental colour: Black except for bright yellow protibia, protarsi and apical part of profemur, middle leg the same, hindleg similar but patch of dark red-brown medially on metatibia; mandibles yellow except for dark apical ends; underside of antenna from pedicel to F9 yellow.



Figs 18–21. *Scrapter chrysomastes* sp. n., terminalia: (18) genitalia (dorsal and ventral views), (19–21) S6–S8. Scale bar = 0.4 mm.

Head: Clypeus shiny with heavy punctation (interspace <0.5 × puncture diameter), no clypeal sulcus. Supraclypeal area flat (no anterior face of supraclypeal area), abundant deep punctures. Paraocular area and frons with fine, reticulate sculpture and heavy punctation. Vertex similar sculpture to paraocular area but less heavily punctured. Ocellar triangle raised in anterior profile. Frontal line weakly carinate. Facial fovea narrow, shallow and inconspicous. Gena shiny, narrower than eye (0.6:1) with moderate punctation and weakly carinulate. Inner eye orbits straight, proportion of lower to upper interocular distance equal. Antenna all segments long and cylindrical, each segment similar in length, antenna long, extending to metasomal terga (Fig. 22).

Mesosoma: Mesoscutum and scutellum shiny with fine, reticulate sculpture and very sparse punctation (interspace >2 × puncture diameter), punctures irregularly clumped, large areas of mesoscutum punctureless, median line and notaulus weakly impressed. Metanotum with roughened sculpture and few punctures. Mes- and metepisternum with fine reticulate sculpture and very sparse punctation, episternal groove straight, weakly pitted, especially in upper part of groove. Propodeum strongly angulate, with shiny, roughened sculpture, propodeal triangle with roughened, complex patterning and weak, irregular network of carinae on basal area, margins of triangle barely pitted.

Metasoma: Tergal discs with fine, reticulate sculpture and very sparse punctation (interspace 2 × puncture diameter). T2 fovea ovoid.

Terminalia: Gonoforceps narrow, inner margin tapering posteriorly, ventrally membraneous, penis valves narrow (Fig. 18). S6 posteriorly concave, tufts of hairs on rear margin of posterior lobes, anteriorly weakly concave (Fig. 19). S7 concave posteriorly forming two, fairy acute, hirsute points (Fig. 20). S8 posterior disc process short, quite hairy, anteriorly truncate (Fig. 21).

Legs: Metabasitibial plate not entire, only posterior carina present. Claws cleft.

Female. Unknown.

Diagnosis: *S. chrysomastes* is one of the most striking species in the genus due to the extremely long antennae (Fig. 22). When fully extended the apical ends of the antennae reach tergum 3. These very long, whip-like antennae immediately distinguish

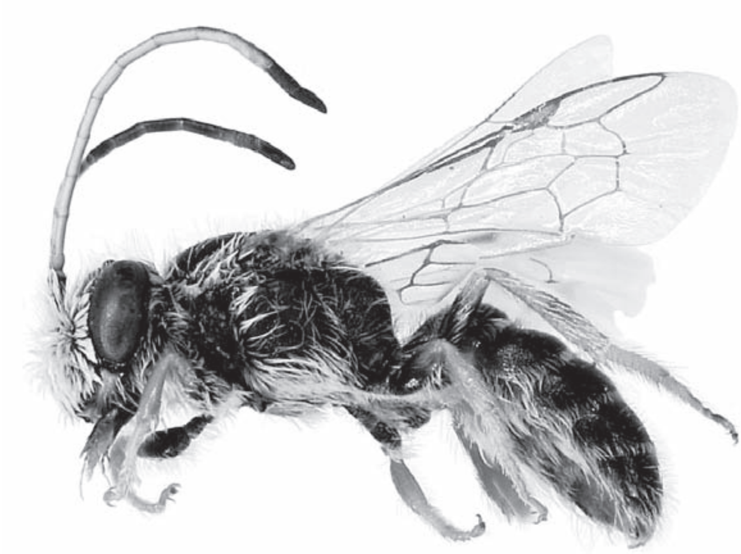


Fig. 22. *Scrapter chrysomastes* sp. n., lateral view of male. Note the extremely long antennae.

S. chrysomastes from all other known *Scrapter* species, and this feature can easily be seen with the naked eye. Also unusual are the largely yellow mandibles—no other *Scrapter* species displays this characteristic (mandibles dark red-brown to black in other species).

Distribution: Only known from the Richtersveld, Northern Cape. The Richtersveld is an arid, rugged region that is renowned for its botanical endemism (Van Wyk & Smith 2001: 38–43). Increasingly, entomologists are paying closer attention to its largely endemic insect fauna (e.g. Stuckenberg 1998). *S. chrysomastes* appears to be another notable Richtersveld endemic, although the plant it was collected on is fairly widespread in Namaqualand.

Biology: The type series was collected in mid-September on *Zygophyllum meyeri* Sond. (Zygophyllaceae). *Z. meyeri*, known as the skilpadbos (= tortoise bush), is a shrub bearing yellow or white flowers, and is common in the rocky hills of the Namaqualand escarpment.

Scrapter eremanthedon Davies, sp. n.

Figs 23–26

Etymology: Gr. *eremia* (desert, wilderness); Gr. *anthedon* (bee).

Holotype ♂: SOUTH AFRICA: *Northern Cape*: Nieuwoudtville, Farm Glen Lyon (31°24'03"S:19°08'34"E), 700 m, 27.viii.2003, M. Kuhlmann (to be deposited in SANC). Paratypes: 2 ♀ collected in Nieuwoudtville area between 23.viii.2003 and 27.viii.2003 (MKPC).

Description:

Male.

Measurements (*n* = 1): head length 1.8 mm, head width 2.2 mm, lower interocular distance 1.4 mm, upper interocular distance 1.4 mm, interantennal distance 0.4 mm, antennocular distance 0.4 mm, length of clypeus 0.4 mm, length of eye 1.3 mm, width of eye (lateral view) 0.7 mm, width of gena (lateral view) 0.4 mm, length of facial fovea 0.4 mm, maximum width of facial fovea 0.1 mm, mesoscutum length 1.2 mm, mesosoma length 2.3 mm, forewing length 5.7 mm, length of pterostigma 1 mm, maximum width of pterostigma 0.2 mm, length of marginal cell beyond pterostigma 1.3 mm, length of marginal cell 1.6 mm, length of free-part of marginal cell 1 mm.

Vestiture: Clypeus with thick, white, appressed, weakly plumose hairs. Supraclypeal area, frons and paraocular area with erect, plumose grey hairs. Scape hairs sparse, white, erect and weakly plumose. Vertex with tall, greyish, plumose hairs, about five black plumose hairs intermixed. Gena ventrally with long, weakly plumose, white hairs. Mesoscutum, scutellum and metanotum covered in sparse (integument easily visible), whitish, plumose hairs with a few black, plumose hairs intermixed. Mes- and metepisterna covered in fairly sparse, long, white, plumose hairs. Propodeum sparsely covered in greyish, plumose hairs (integument easily visible). T1–T5 discs covered in sparse, inconspicuous, short, whitish hairs, no posterior hair bands; visible part of T6 covered in long, plumose, mainly black bristles. Sterna covered sparsely in long, white, plumose hairs, no posterior hair bands.

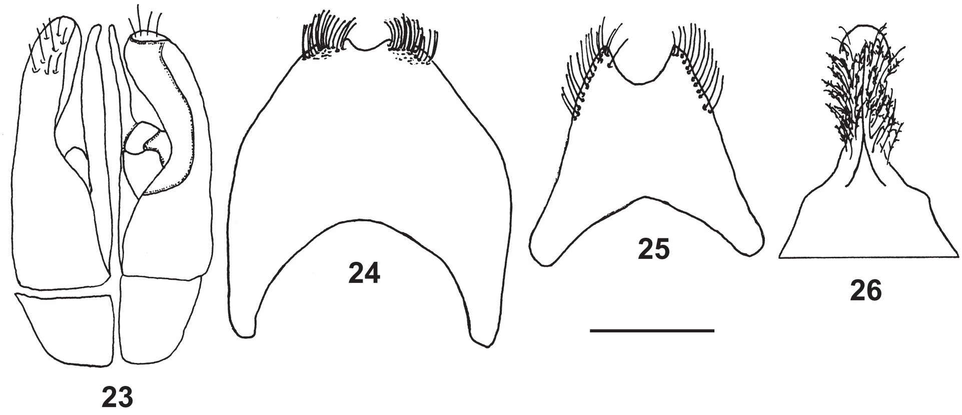
Integumental colour: All black except that flagellomeres slightly paler ventrally (but no orange or yellow colouring).

Head: Clypeus protuberant and shiny with fairly dense punctation (interspace approximately 1 × puncture diameter), punctation denser on apical edge (interpsace approximately 0.5 × puncture diameter), integument finely reticulate between punctures; no clypeal sulcus. Supraclypeal area raised, anterior face of supraclypeal area shiny with fine reticulate sculpture. Paraocular area with roughened, near-carinulate sculpture. Frontal line carinate. Frons with roughened, almost carinulate sculpture. Facial fovea ovoid, smooth and easily discernable from surrounding integument. Inner eye orbits straight, proportion of lower to upper interocular distance equal. Vertex with roughened sculpture, but not carinulate, rounded in anterior profile. Gena weakly carinulate and narrower than eye (0.6:1). F1 slightly elongate. Antenna long, reaching scutellum.

Mesosoma: Mesoscutum and scutellum with shiny, reticulate sculpture and fairly dense punctation (interspace 1 × puncture diameter), median line and notaulus shallowly impressed. Metanotum with rough, reticulate sculpture and sparse punctation. Mes- and metepisterna with dense reticulate sculpture, episternal groove arced forward, pitted throughout. Propodeum strongly angulate, propodeal triangle basal area almost horizontal, weak longitudinal carinae on basal area, remainder of triangle with uniform, roughened, reticulate pattern, margins of triangle not pitted.

Metasoma: All tergal discs with uniform, finely reticulate reticulate sculpture. T1–T5 with sparse micropunctation (interspace >2 × puncture diameter). T6 with denser punctation (interspace 0.5–1 × puncture diameter), punctures also larger. T2 fovea indistinct ovoid.

Terminalia: Gonobase large, gonoforceps hairy posteriorly, ventrally membraneous, penis valves narrow (Fig. 23). S6 posteriorly weakly concave, tufts of hair on rear margin of posterior lobes, anteriorly strongly concave (Fig. 24). S7 concave posteriorly, hirsute posterolaterally (Fig. 25). S8 glued to card, anterior region not discernable, rounded and very hairy posteriorly (Fig. 26).



Figs 23–26. *Scrapter eremanthedon* sp. n., terminalia: (23) genitalia (dorsal and ventral views), (24–26) S6–S8. Scale bar = 0.4 mm.

Legs: Metabasitibial plate almost entire, with anterior tooth. Claws deeply bifid.

Female.

Measurements (*n* = 2): head length 1.9 mm, head width 2.3 mm, lower interocular distance 1.6 mm, upper interocular distance 1.5 mm, interantennal distance 0.4 mm, antennocular distance 0.5 mm, length of clypeus 0.6 mm, length of eye 1.4 mm, width of eye (lateral view) 0.7 mm, width of gena (lateral view) 0.3 mm, length of facial fovea 0.4 mm, maximum width of facial fovea 0.1 mm, mesoscutum length 1.4 mm, mesosoma length 2.5 mm, forewing length 6 mm, length of pterostigma 0.9 mm, maximum width of pterostigma 0.3 mm, length of marginal cell beyond pterostigma 1.2 mm, length of marginal cell 1.5 mm, length of free-part of marginal cell 0.9 mm.

Vestiture: Clypeus and lower paraocular area with sparse, sub-erect, plumose yellow-white hairs. Scape, frons, upper supraclypeal area and upper paraocular area with fairly dense, erect, plumose greyish hairs. Vertex covered in sparse, erect, whitish plumose hairs (varying in length) and interspersed with several erect, black hairs. Gena sparsely hairy except ventrally where long, downward-projecting, plumose hairs present. Mesoscutum covered in sparse, short, yellow-white, plumose hairs with some black hairs intermixed. Scutellum and metanotum similar to mesoscutum, but hairs denser and more orange. Mesepisternum sparsely covered in white, plumose hairs but ventrally vestiture thicker. Propodeum with fairly dense, yellowish, erect, plumose hairs. T1 and T2 very sparsely pubescent (superficially appear hairless), except laterally where fairly dense, sub-erect, plumose white hairs present. T3 and T4 appear hairless but covered in many, tiny, inconspicuous, short, white hairs. T5 prepygidial fimbria consists of dense, sub-erect, plumose, stout, black hairs. S2–S5 with sparse, sub-erect, whitish plumose hairs. Probasitarsus with anterior brush of golden, simple hairs projecting distally, posteriorly with thick, stiff-haired golden brush. Metatibial scopa anteriorly with long, white, palmate hairs, dorso-posteriorly with ridge of black, plumose, stout hairs, and posteriorly with longish, straight, white, simple keirotrichiae.

Integumental colour: All black except F10–F11 ventrally dull orange.

Head: Clypeus protuberant with finely reticulate sculpture and fairly dense punctation (0.5–1 × puncture diameter interspace), no clypeal sulcus. Supraclypeal area raised, anterior face of supraclypeal area shiny, largely punctureless with finely reticulate sculpture. Paraocular area with reticulate sculpture and dense punctation (0.5 × puncture diameter interspace). Upper paraocular area, frons and vertex distinctly carinulate. Frontal line barely carinate. Facial fovea shallow, smooth, elongate ovoid and easily discernable from surrounding integument. Gena narrower than eye (0.4:1), with reticulate sculpture and fairly dense punctation. Inner eye orbits straightish, proportion of upper to lower interocular distance 0.9:1. Vertex rounded in anterior profile. F1 slightly elongate.

Mesosoma: Mesoscutum with reticulate sculpture and sparse punctation (approximately 2 × puncture diameter interspace), median line moderately impressed, quite broad, notaulus very weak. Scutellum and metanotum similar sculpture to mesoscutum but punctation denser. Mesepisternum with roughened sculpture, almost carinulate, episternal groove arced forward and weakly pitted. Propodeum angulate, with shiny, reticulate sculpture, propodeal triangle with uniform, reticulate pattern lacking carinae, margins of triangle not pitted.

Metasoma: Tergal discs with fine, reticulate sculpture and sparse, tiny punctures. T5 with denser, larger punctures. T2 fovea broad ovoid.

Legs: Metabasitibial plate composed of two carinae (anterior and posterior), posterior carina tuberculate apically. Claws weakly cleft.

Diagnosis: *S. eremanthedon* is an entirely black bee, including the ventral sides of the antennae (orangish in female). In Eardley's (1996) key, the male comes to *S. niger*, but differs from that species in the protuberant clypeus, reticulate mesoscutum, less dense scutal punctation, strongly angulate propodeum and fairly elongate F1. The female is identified by the reticulate sculpture, sparse mesoscutal punctation, carinulate vertex, lack of a clypeal sulcus, lack of tergal hair bands, distinctly orange-brown vestiture of mesosoma, angled propodeum and uniformly reticulate propodeal triangle, non-entire metabasitibial plate and protuberant clypeus. The female resembles the female of *S. niger*, but lacks the clypeal tubercle and has bifid not simple claws.

Distribution: Only known from the Nieuwoudtville area, Northern Cape (Succulent Karoo biome).

Biology: Specimens have been collected in late August, at the beginning of the austral spring. Specimens have been taken on an *Oxalis* species (Oxalidaceae).

Scrapter glarea Davies, sp. n.

Figs 27–30

Etymology: L. *glarea* (gravel). A noun in apposition, in reference to the type locality, the Knersvlakte, an area characterised by its quartz gravel fields.

Holotype ♂: SOUTH AFRICA: *Western Cape*: 30 km N Vanrhynsdorp (31°22'23"S:18°42'37"E), Knersvlakte, 146 m, 5.ix.2003, K. Timmermann (SANC). Paratype: 1♂ from type locality collected on 29.ix.2003 (MKPC).

Description:

Male.

Measurements (*n* = 2): head length 1.3 mm, head width 1.5 mm, lower interocular distance 0.8 mm, upper interocular distance 1.1 mm, interantennal distance 0.4 mm, antennocular distance 0.2 mm, length of clypeus 0.5 mm, length of eye 1 mm, width of eye (lateral view) 0.4 mm, width of gena (lateral view) 0.3 mm, length of facial fovea 0.2 mm, maximum width of facial fovea 0.02 mm, mesoscutum length 0.9 mm, mesosoma length 1.7 mm, forewing length 4.1 mm, length of pterostigma 0.7 mm, maximum width of pterostigma 0.2 mm, length of marginal cell beyond pterostigma 0.9 mm, length of marginal cell 1.1 mm, length of free-part of marginal cell 0.7 mm.

Vestiture: Clypeus, lower paraocular area and supraclypeal area with long, thick, weakly plumose, decumbent white hairs (integument obscured). Upper paraocular area, frons and vertex with sparse, erect, whitish hairs. Scape with sparse, whitish hairs. Gena with sparse, whitish, weakly plumose hairs. Mesoscutum covered in sparse, erect, rather short, whitish, plumose vestiture. Scutellum and metanotum similar to mesoscutum but hairs light orange-brown. Sides of mesosoma with long, white, plumose hairs. T2–T4 (but more T2–T3) with dense, short, decumbent, white pubescence on anterior part of tergal discs, T5 sparse, whitish, short hairs, T1 largely hairless. Sterna largely hairless.

Integumental colour: Mainly black. Antenna ventrally yellow. Protibia yellow (but with dark brown patch posteriorly), extreme apical end of profemur also yellow. Apical end of mesofemur, -tibia (except for posterior brown patch) and -tarsus yellow. Hindleg resembles middle leg.

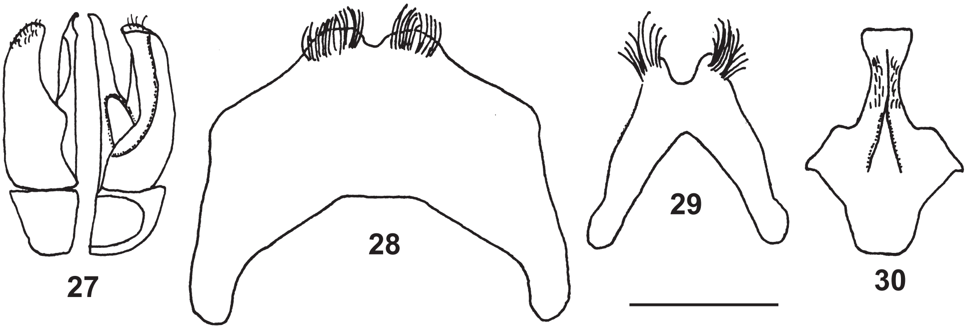
Head: Clypeus smooth with dense punctation (interspace 0.5 × puncture diameter), no clypeal sulcus. Supraclypeal area raised, anterior face of supraclypeal area largely impunctate (interspace >3 × puncture diameter) and smooth. Frontal line weakly carinate. Frons and upper paraocular area carinulate. Facial fovea sulcoid and inconspicuous. Ocellar triangle raised in anterior profile. Gena slightly narrower than eye (0.8:1), fairly densely punctate and finely reticulate. Inner eye orbits diverging dorsally, proportion of lower to upper interocular distance 0.7:1. F1 not elongate. Antenna quite long, reaching metanotum.

Mesosoma: Mesoscutum with fine, reticulate sculpture and sparse punctation (interspace >2 × puncture diameter), median line weakly impressed, notaulus very weak. Scutellum and metanotum sculpture similar to mesoscutum but punctation denser. Mes- and metepisterna with rough, reticulate sculpture and fairly dense punctation, episternal groove straight, pitted throughout. Propodeum angulate with roughened reticulation and fairly dense punctation, propodeal triangle with uniform, reticulate sculpture and weak anterior carinae on basal area.

Metasoma: T1–T5 discs with finely reticulate sculpture. T2–T4 with dense micropunctation on anterior part of discs, remainder of discs impunctate. T5 with more evenly spaced macropunctation. T2 fovea elongate ovoid.

Terminalia: Gonobase large, gonoforceps margins smooth and largely parallel, rounded posteriorly, hirsute, ventrally with transparent membrane, penis valves narrow, ending in acute point (Fig. 27). S6 large in relation to S7 and S8, weakly concave posteriorly with hairy posterior margin to lobes, strongly concave anteriorly (Fig. 28). S7 concave posteriorly, hirsute posterolaterally (Fig. 29). S8 posterior disc with hind margin truncate, posteriorly fairly hairy, anteriorly sub-truncate (Fig. 30).

Legs: Metabasitibial plate entire in holotype, but only posterior carina visible in paratype. Claws deeply cleft.



Figs 27–30. *Scrapter glarea* sp. n., terminalia: (27) genitalia (dorsal and ventral views), (28–30) S6–S8. Scale bar = 0.4 mm.

Female. Unknown.

Diagnosis: *S. glarea* is an elongate, small bee characterised by its lack of a clypeal sulcus, inconspicuous, sulcoid facial fovea, raised ocellar triangle, starkly yellow tibiae and tarsi and leathery mesoscutum with reduced punctation. The S7 recalls *S. niger*, but *S. glarea* is smaller, and differs in the features mentioned above, especially in having reduced mesoscutal punctation, and also in having a sub-truncate hind margin to S8.

Distribution: Only known from the Knersvlakte, near Vanrhynsdorp, Western Cape (Succulent Karoo biome). See comments under *S. acanthophorus* regarding this region.

Biology: Type series collected in September. No pollen/nectar source data.

Scrapter oxyaspis Davies, sp. n.

Figs 31–35

Etymology: Gr. *oxy* (sharp or pointed); Gr. *aspis* (shield). In reference to the distinctive, sharp point on the posterior margin of S7 (Fig. 33).

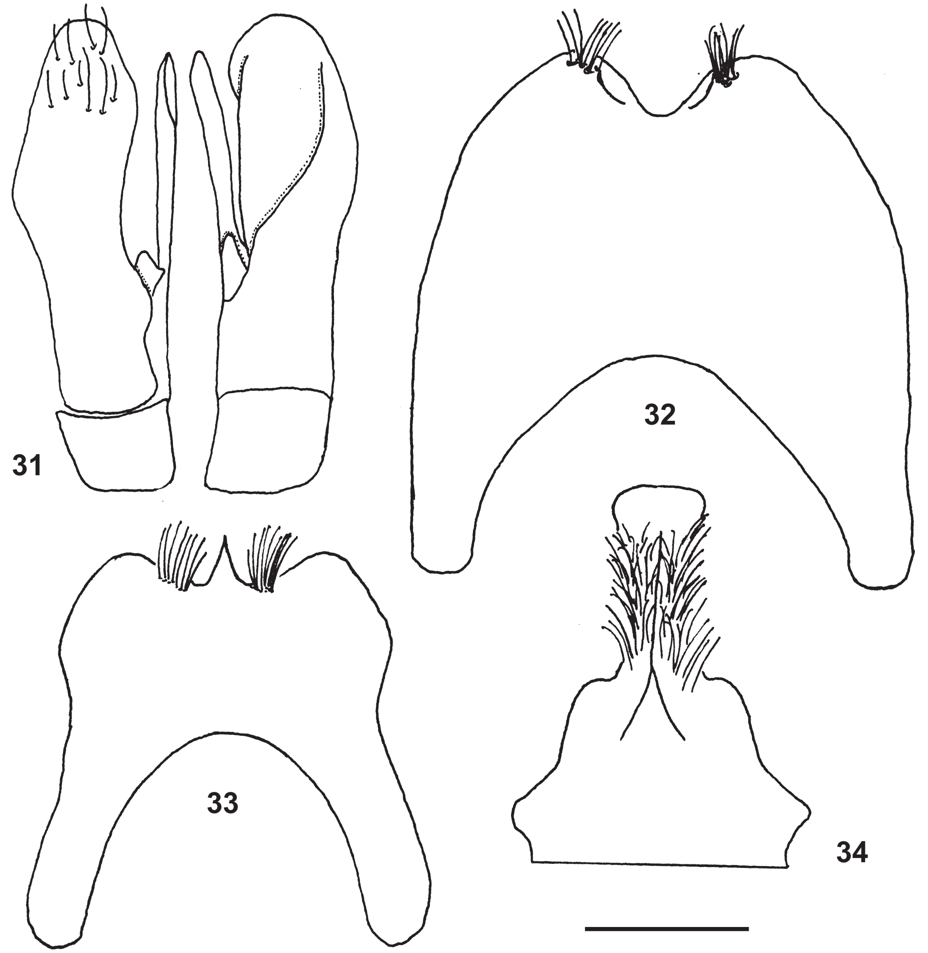
Holotype ♂: SOUTH AFRICA: *Northern Cape*: Nieuwoudtville, Farm Glen Lyon (31°24'03"S:19°08'34"E), 7.ix.2003, M. Kuhlmann. (SANC). Known from holotype only.

Description:

Male.

Measurements (*n* = 1): head length 1.9 mm, head width 2.5 mm, lower interocular distance 1.3 mm, upper interocular distance 1.7 mm, interantennal distance 0.4 mm, antennocular distance distance 0.4 mm, length of clypeus 0.6 mm, length of eye 1.5 mm, length of facial fovea 0.5 mm, maximum width of facial fovea 0.08 mm, width of eye (lateral view) 0.6 mm, width of gena (lateral view) 0.5 mm, mesoscutum length 1.6 mm, mesosoma length 2.4 mm, forewing length 7 mm, length of pterostigma 1.1 mm, maximum width of pterostigma 0.3 mm, length of marginal cell beyond pterostigma 1.6 mm, length of marginal cell 1.9 mm, length of free part of marginal cell 1.1 mm.

Vestiture: Almost entirely white. Head very hairy and underlying integument difficult to discern. Clypeus entirely covered by thick, long, starkly white, weakly plumose, decumbent hairs. Paraocular area, supraclypeal area and frons with erect, greyish, plumose hairs. Scape hairs long, sparse, white and plumose. Vertex with sparse, long,



Figs 31–34. *Scrapter oxyaspis* sp. n., terminalia: (31) genitalia (dorsal and ventral views), (32–34) S6–S8. Scale bar = 0.4 mm.

grey, erect, plumose hairs. Gena with shortish, white hairs. Mesosoma appears very woolly. Mesoscutum covered with thick, flowing, long, white, plumose hairs but underlying integument easily visible. Scutellum and metanotum resembling mesoscutum but proximal third of hairs dark. Mesepisternum sparsely covered in long, grey, plumose hairs but becoming much denser and whiter ventrally. Metepisternum and propodeum with sparse, long, grey hairs. All terga lack posterior hair bands, each disc on T1–T5 with long, erect, white, plumose hairs (but underlying integument clearly visible), marginal zones of terga with weak, sub-erect, white hairs, T6 with much shorter hairs on disc and longer, black (not white) hairs on marginal zone. S2 and S3 with posterior third covered in long, appressed, white hairs, other sterna less hairy, S5 and S6 almost hairless.

Integumental colour: All black (including mandibles), no trace of yellow or red-brown colouration except claws proximally yellow and flagellomeres ventrally dark brown.

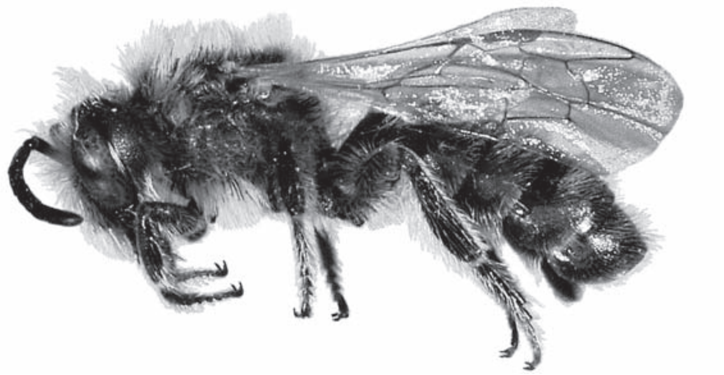


Fig. 35. *Scrapter oxyaspis* sp. n., lateral view of holotype.

Head: Clypeus with dense punctation (interspace <0.5 × puncture diameter), no clypeal sulcus. Supraclypeal area raised, anterior face of supraclypeal area shiny and punctureless with finely reticulate pattern. Frontal line barely carinate. Inner eye orbits diverging slightly dorsally, proportion of lower to upper interocular distance 0.8:1. Paraocular area and frons densely punctate (interspace <0.5 × puncture diameter). Frons and vertex heavily carinulate. Facial fovea irregular ellipsoid, weakly differentiated from surrounding integument. Gena heavily punctate (interspace 0.5–1 × puncture diameter), and slightly narrower than eye width (0.8:1). Vertex rounded in anterior profile. F1 not elongated. Antenna long reaching scutellum.

Mesosoma: Mesoscutum with moderate punctation (interspace 1–1.5 × puncture diameter) and shiny, finely reticulate interspaces, median line and notaulus weakly impressed. Scutellum sculpture and punctation similar to mesoscutum. Mes- and metepisternum with finely reticulate sculpture, episternal groove arced forward, pitted except near top of groove. Propodeum weakly declivitous, propodeal triangle dull with uniform, reticulate pattern, anterior carinae on basal area very weak, margins of triangle indistinctly pitted.

Metasoma: Tergal discs with finely reticulated integument and moderate punctation (interspace 1–1.5 × puncture diameter); T1 anterior, mediolongitudinal groove present; T2 fovea elliptical.

Terminalia: Gonobase large, gonoforceps posteriorly hairy (>20 golden plumose hairs), ventrally membraneous, penis valves narrow (Fig. 31). S6 posteriorly concave, tuft of hairs on rear margin of posterior lobes, anteriorly strongly concave (Fig. 32). S7 posteriorly terminating in fine, sharp point, rear margin of sternum also hairy (hairs erect, yellow and plumose) (Fig. 33). S8 posteriorly blunt-tipped and very hairy (hairs erect, yellow and plumose), S8 glued to card and anterior portion not discernable (Fig. 34).

Legs: Metabasitibial plate entire. Claws deeply cleft.

Female. Unknown.

Diagnosis: *S. oxypaspis* is a medium-sized, all black, very hairy bee (Fig. 35). It is characterised by its lack of any yellow integument, leathery mesoscutum, structure of the genitalia and S7, shiny, punctureless anterior face of supraclypeal area, weakly developed facial fovea, no clypeal sulcus, entire metabasitibial plate, very hairy mesosoma and uniformly patterned propodeal triangle. In Eardley's (1996) key, *S. oxyaspis* exits at *S. striatus*, but differs from that species in the shape of the terminalia (see illustrations), facial fovea (distinct in *S. striatus*), propodeal triangle sculpture (*S. striatus* has conspicuous carinae), shiny unpunctured supraclypeal area and lack of yellow on the legs. Superficially, *S. oxyaspis* recalls *S. tomentum*, but differs strongly from this species in lacking the distinctive flagellomere colour pattern and flat supraclypeal area of *S. tomentum*. Furthermore the terminalia are quite different (e.g. *S. tomentum* S7 is concave posteriorly). *S. oxyaspis* also resembles *S. capensis*, but the S7 of *S. oxyaspis* is distinct and the holotype lacks the brownish vestiture of the mesoscutum and scutellum that is characteristic of *S. capensis*.

Distribution: Only known from the Nieuwoudtville area, Northern Cape (Succulent Karoo biome).

Biology: The holotype was collected in early September, suggesting *S. oxyaspis* is an early spring bee. The holotype was collected in Renosterveld on an *Oxalis* species (Oxalidaceae).

Scrapter sittybon Davies, sp. n.

Figs 36–39

Etymology: Gr. *sittybon* (small piece of parchment or skin). In reference to the unique S7 (Fig. 38).

Holotype ♂: SOUTH AFRICA: *Western Cape*: 40 km north-east of Vanrhynsdorp, Farm Kalkgat (31°07'04"S:18°55'18"E), 140 m, 10.ix.2003, K. Timmermann (SANC). Paratype: 1♂ collected 30 km north of Vanrhynsdorp in the Knersvlakte, 5–6.ix.2003.

Description:

Male.

Measurements ($n = 2$): head length 1.2 mm, head width 1.5 mm, lower interocular distance 0.8 mm, upper interocular distance 1 mm, interantennal distance 0.2 mm, antennocular distance 0.2 mm, length of clypeus 0.4 mm, length of eye 1 mm, width of eye (lateral view) 0.6 mm, width of gena (lateral view) 0.3 mm, length of facial fovea 0.2 mm, maximum width of facial fovea 0.02 mm, mesoscutum length 0.8 mm, mesosoma length 1.7 mm, forewing length 3.2 mm, length of pterostigma 0.5 mm, maximum width of pterostigma 0.1 mm, length of marginal cell beyond pterostigma 0.6 mm, length of marginal cell 0.9 mm, length of free-part of marginal cell 0.6 mm.

Vestiture: Clypeus, anterior face of supraclypeal area and lower parts of paraocular area with thick, white, decumbent hairs. Remainder of supraclypeal area, frons, vertex and upper parts of paraocular area with fairly dense, erect, whitish hairs. Gena with short, whitish hairs but thicker ventrally. Mesoscutum, scutellum and metanotum with short, plumose, gold-white hairs. Sides of mesosoma with very sparse, whitish, plumose hairs. T1 largely hairless except for very sparse, scattered, inconspicuous white hairs. T2–T4 with distinctive bands of short, thick, white pubescence adjacent to graduli, remainder of discs hairless. T5–T6 sparse, plumose hairs, hairs stout on T6.

Integumental colour: Largely black. Antenna F1–F3 ventrally yellow-orange, dorsally blackish, F4–F11 all yellow-orange. Protibia, protarsus and extreme apical end of profemur all orange-yellow. Middle leg similar to foreleg. Extreme apical end of metafemur and proximal end of metatibia yellow-orange, metatarsus dark orange-brown.

Head: Clypeus shiny and smooth with heavy punctation (interspace <0.5 × puncture diameter), no clypeal sulcus. Supraclypeal area, paraocular area and frons sculpture and punctation similar to clypeus. Ocellar triangle weakly raised in anterior profile. Facial fovea a sulcus. Frontal line weakly carinate. Gena much narrower than eye (0.5:1), with fairly dense punctation and reticulate sculpture. Inner eye orbits diverging slightly dorsally, proportion of lower to upper interocular distance 0.8:1. Antenna long, reaching metanotum.

Mesosoma: Mesoscutum shiny and smooth with dense punctation (interspace 0.5–1 × puncture diameter), median line and notaulus weakly impressed. Scutellum sculpture similar to mesoscutum but punctation less dense. Metanotum with roughened sculpture and heavy punctation. Mes- and metepisterna with weakly carinulate sculpture and fairly dense punctation. Propodeum angulate, sides of propodeum with clumped punctation and roughened sculpture, propodeal triangle with weak network of carinae throughout including longitudinal carinae on basal area, margins of triangle weakly pitted.

Metasoma: T1–T6 with reticulate sculpture on discs. T1–T4 with fairly dense punctation (interspace approximately 1 × puncture diameter), T2–T4 punctation especially pronounced towards graduli. T5–T6 fewer, larger punctures which are not concentrated around the graduli. T2 fovea elongate ovoid.

Terminalia: Genitalia fairly complex; gonobase very large, gonoforceps tapering to acute point posteriorly, not hairy, has several membraneous invaginations ventrally, penis valves curved inwards, short, spike-like projection on inner margin of valves (Fig. 36). S6 medio-posteriorly extended with rear margin slightly concave and hairy, anteriorly strongly concave (Fig. 37). S7 distinctive, concave posteriorly, two acute processes fringed by transparent, rounded appendages bearing hairy posterior margins (Fig. 38). S8 rounded anteriorly, fairly hairy on posterior process (Fig. 39).

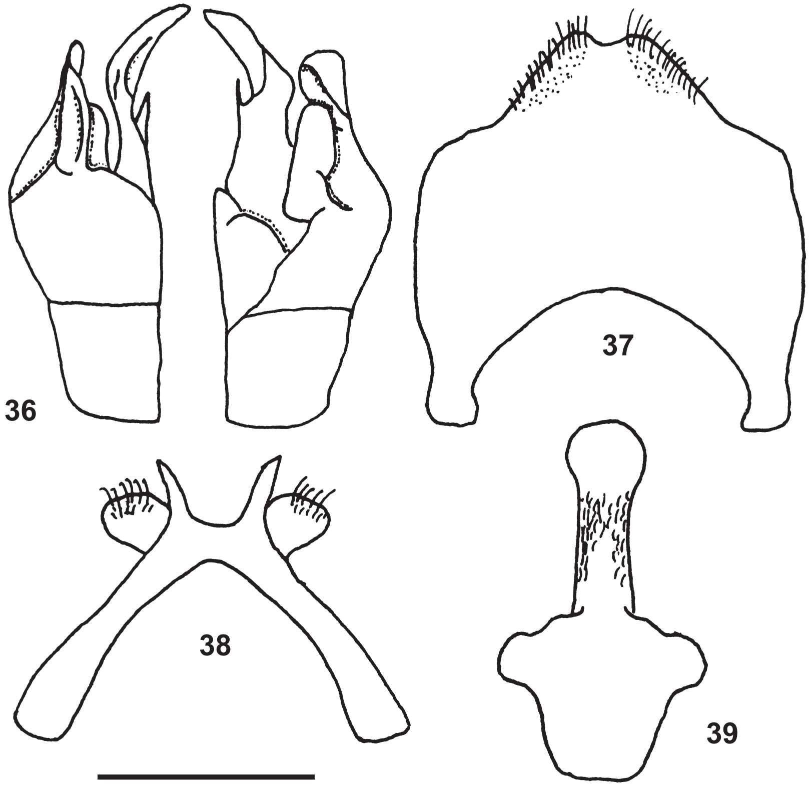
Legs: Metabasitibial plate entire. Claws deeply cleft.

Female. Unknown.

Diagnosis: *S. sittybon* keys to *S. calx* in Eardley's (1996) key, but it differs markedly from *S. calx* in lacking the shiny, impunctate mesoscutum of that species. Further, *S. calx* has no carinae on the propodeal triangle (in sharp contrast to *S. sittybon*), and the metabasitibial plate of *S. calx* is also extremely hairy. The S7 of *S. sittybon* is diagnostic, with characteristic posterolateral, transparent 'flaps'. Further general distinguishing features of *S. sittybon* include the lack of a clypeal sulcus, sulcoid facial fovea, entire metabasitibial plate, short pubsecence on anterior part of terga and bifid claws. *S. sittybon* has similarities to the *S. nitidus* complex, but the lack of a clypeal sulcus and distinctive terminalia facilitate separation from that group.

Distribution: Only known from the Knersvlakte, near Vanrhynsdorp, Western Cape. See comments under *S. acanthophorus* regarding this region.

Biology: Type series collected in September. No data on pollen/nectar sources.



Figs 36–39. *Scrapter sittybon* sp. n., terminilia: (36) genitalia (dorsal and ventral views), (37–39) S6–S8. Scale bar = 0.4 mm.

Scrapter albifumus Eardley, 1996

Scrapter albifumus: Eardley 1996: 74, figs 70–72, 81. (Type locality: Cornell's Kop, Richtersveld, Northern Cape)

Description:

Female.

Material examined: 4 ♀ SOUTH AFRICA: *Northern Cape*: Richtersveld National Park (28°18'S:16°58'E), 12–14.ix.2001, C. Eardley (SANC); 8 ♀ on road to Richtersveld National Park between Annis and Dabie River (28°20'S:16°55'E), 19.ix.1997, F.W. and S.K. Gess (AMGS); 7 ♀ Richtersveld National Park, 1.5 km from Helskloof (28°18'S:16°57'E), 19.ix.1997, F.W. and S.K. Gess (AMGS).

Measurements (n = 3): head length 1.4 mm, head width 1.7 mm, lower interocular distance 1.1 mm, upper interocular distance 1.1 mm, interantennal distance 0.3 mm, antennocular distance 0.3 mm, length of clypeus 0.4 mm, length of eye 1.1 mm, width of eye (lateral view) 0.5 mm, width of gena (lateral view) 0.3 mm, length of facial fovea 0.4 mm, maximum width of facial fovea 0.02 mm, mesoscutum length 1 mm, mesosoma length 2 mm, forewing length 4.1 mm, length of pterostigma 0.6 mm, width of pterostigma 0.2 mm, length of marginal cell beyond pterostigma 1 mm, length of marginal cell 1.1 mm, length of free part of marginal cell 0.7 mm.

Vestiture: Very hairy bee, hairs generally short, bristly and compact. Clypeus, supraclypeal area and lower paraocular area with sparse, white, decumbent, bristly hairs. Upper paraocular area and frons with fairly thick, erect, white hairs. Vertex similar to frons but hairs sparser. Scape with a few, very short, white hairs. Gena with thick, white, bristly hairs. Mesoscutum with short, yellowish, bristly, moderately dense hairs. Scutellum and metanotum similar to mesoscutum but with longer, denser, more orangish hairs. Mes- and metepsiterna with long, white, fairly dense, bristly hairs. Propodeum with thick, largely plumose, white hairs. T1–T4 with conspicuous, posterior, white, hair bands along marginal zones. T1 anteriorly with fairly dense, white vestiture (but integument easily visible). Sides of discs on T1–T4 with sub-erect, bristly, white hairs. T5 prepygidial fimbria composed of thick, white and bristly hairs. S1–S2 bearing palmate-haired scopa, remaining sterna weakly hairy. Anterior probasitarsal brush with simple hairs. Metatibial scopa composed of all white, plumose, hairs except posteriorly where long, white, simple keirotrichiae present.

Integumental colour: Mainly black. Undersides of F1–F8 and all of F9–F10 orange. Apical end of profemur, protibia and protarsus orange.

Head: Clypeus and supraclypeal area with finely reticulate sculpture and moderately dense punctation (interspace 1 × puncture diameter). Paraocular area and frons sculpture similar to clypeus but punctation denser. Facial fovea a sulcus. Frontal line extremely weak. Ocellar triangle very weakly raised in anterior profile. Gena narrower than eye (0.6:1), with dense punctation (interspace 0.5–1 × puncture diameter). Inner eye orbits straight, proportion of lower to upper interocular distance equal. Antenna shortish, reaching tegula.

Mesosoma: Mesoscutum with shiny, reticulate sculpture and dense punctation (interspace 0.5–1 × puncture diameter), median line and notaulus very weak. Scutellum and metanotum sculpture similar to mesoscutum but punctation reduced on anterior part of scutellum. Mesepisternum with coarsely reticulate sculpture and fairly dense punctation, episternal groove arced forward, pitted throughout. Propodeum strongly angulate, with coarse reticulation and fairly dense punctation, propodeal triangle with uniform, reticulate sculpture and no carinae.

Metasoma: Tergal discs with fine, reticulate sculpture and scattered punctation, punctures denser and larger on T5. T2 fovea ovoid.

Legs: Metabasitibial plate entire, rather round, extremely hairy. Claws toothed.

Remarks: These are the first females of *S. albifumus* found, and all were collected in the Richtersveld. Most of the male *S. albifumus* specimens Eardley (1996) listed were also collected in the Richtersveld. The distinctive features of this region are discussed under *S. chrysomastes*. Eardley (1996: 74) noted that the males 'usually die with the metasoma curved under the body'. In the female specimens collected in September 2001, this is also the case, and gives the bees a characteristic posture on the pin (Fig. 40). However, the samples collected by Drs F.W. and S.K. Gess appear to have come from pan traps (hairs matted down and distorted), and they are not curled up on their pins. The species has been recorded foraging on *Zygophyllum prismatocarpum* E. Mey. ex Sond. (Zygophyllaceae) by F.W. and S.K. Gess.

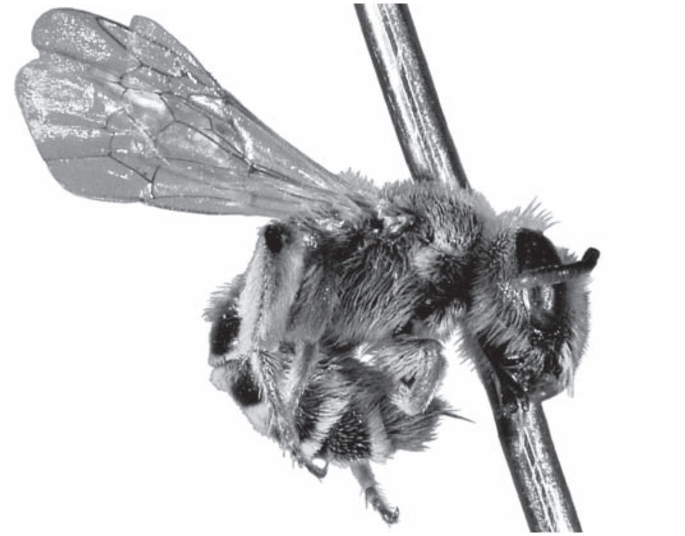


Fig. 40. *Scrapter albifumus* Eardley, lateral view of female showing characteristic curled-up posture on pin.

Scrapter amplispinatus Eardley, 1996

Scrapter amplispinatus: Eardley 1996: 80, 81, figs 81, 88–90. (Type locality: Hartebeesfontein Farm, Middelpos, Northern Cape)

Description:

Female.

Material examined: 1♀ SOUTH AFRICA: *Northern Cape*: Elandsfontein (31°46'S:20°03'E), 16.ix.1999, V. Whitehead (SAMC).

Measurements ($n = 1$): head length 2.6 mm, head width 3 mm, lower interocular distance 2 mm, upper interocular distance 2.1 mm, interantennal distance 0.4 mm, antennocular distance 0.6 mm, length of clypeus 0.8 mm, length of eye 1.8 mm, width of eye (lateral view) 1.1 mm, width of gena (lateral view) 0.5 mm, length of facial fovea 0.7 mm, maximum width of facial fovea 0.2 mm, mesoscutum length 1.9 mm, mesosoma length 3.5 mm, forewing length 8.1 mm, length of pterostigma 1.1 mm, maximum width of pterostigma 0.3 mm, length of marginal cell beyond pterostigma 1.7 mm, length of marginal cell 2.1 mm, length of free-part of marginal cell 1.3 mm.

Vestiture: Clypeus, supraclypeal area, paraocular area and frons with sparse, black, weakly plumose, sub-erect hairs. Vertex similar but hairs erect. Gena adjacent to eye with sparse, black hairs, gena towards occiput with thick, white, plumose hairs. Mesoscutum covered in short, fairly dense (integument easily visible), erect, yellowish, plumose hairs, some taller black hairs intermixed. Scutellum and metanotum similar to mesoscutum but with thicker, longer, yellower hairs. Mes- and metepisterna with long, fairly dense, white hairs. Propodeum with fairly dense, strongly plumose hairs. T1–T4 with distinct posterior, white hair bands along marginal zones, remainder of discs with sparse, short, whitish hairs, particularly laterally. T5 prepygidial fimbria composed of thick, black, mostly plumose, decumbent hairs. S1 and S2 centrally with fairly thick,

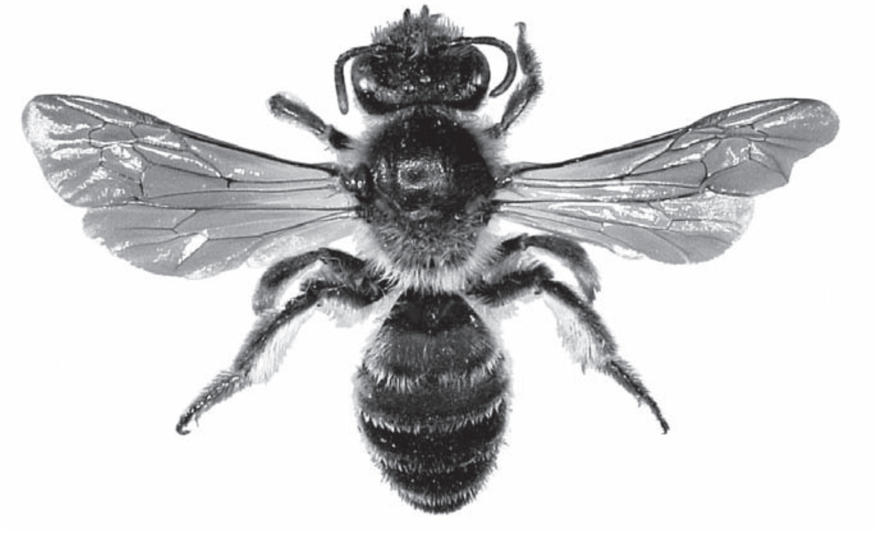


Fig. 41. *Scrapter amplispinatus* Eardley, dorsal view of female.

strongly plumose scopa, remaining sterna with moderate vestiture. Anterior probasitarsal brush hairs simple. Metatibial scopa anteriorly bearing white, plumose hairs, dorsally with ridge of dark, plumose hairs, posteriorly thick, white, simple keirotrichiae.

Integumental colour: Largely black. Antenna ventrally orange. Hindlegs with orangish wash.

Head: Broad. Clypeus with finely reticulate sculpture and dense punctation (interspace 0.5 × puncture diameter), clypeal sulcus present. Supraclypeal area, paraocular area, and frons sculpture and punctation similar to clypeus. Frontal line largely carinate. Facial fovea broad, shallow, shiny and conspicuous. Vertex rounded in anterior profile. Gena much narrower than eye (0.5:1), with dense punctation, almost carinulate. Inner eye orbits straight, proportion of lower to upper interocular distance equal. F1 slightly elongate. Antenna quite long, reaching scutellum.

Mesosoma: Mesoscutum with very dense, uniform punctation (interspace <0.5 × puncture diameter), narrow interspaces weakly reticulate. Scutellum and metanotum sculpture and punctation similar to mesoscutum. Mesepisternum with roughened, almost carinulate sculpture and dense punctation (interspace 1 × puncture diameter), episternal groove pitted throughout, although weakly above. Propodeum declivitous, fairly dense punctation and coarse, reticulate sculpture, propodeal triangle greatly reduced forming three acute points, uniform reticulate sculpture.

Metasoma: T1–T4 discs with dull, roughened, dense reticulate sculpture and micro-punctation. T5 similar but with larger punctures. T2 fovea very broad and rounded.

Legs: Metabasitibial plate composed of two carinae (anterior and posterior), posterior carina becomes tuberculate apically (three separate tubercles). Claws simple. The male of the species has a greatly swollen anterior (outer) metatibial spur (hence the specific epithet); the female has an unmodified anterior metatibial spur.

Remarks: *S. amplispinatus* was described from Middelpos in the Roggeveld Moutains of the Northern Cape. The present female specimen (Fig. 41) was also collected from the Roggeveld Mountains together with three males. Two of the males and the female were collected on flowers of *Polycarena aurea* Benth. (Scrophulariaceae). The remaining male was collected on a *Selago* species (Scrophulariaceae). The Roggeveld Mountains fall within the Succulent Karoo biome, and the area forms part of the 'Hantam-Roggeveld Centre' of plant endemism (Van Wyk & Smith 2001: 72–81). The region is characterised by low, mainly winter rainfall (usually less than 300 mm) and exceedingly cold winters (night temperatures usually fall well below 0°C during winter). The Roggeveld region is noted for its exceptionally rich asilid fauna (Londt 1994: 119–120), and it is possible many insects occurring in the area will be found to be endemics. *S. amplispinatus* is evidently such an endemic.

Scrapter nitidus (Friese, 1909)

Polyglossa nitida: Friese 1909: 124. (Type locality: Steinkopf, Namaqualand, Northern Cape)
Polyglossa (*Strandiella*) *nitida* Friese: Friese 1925: 514.
Scrapter nitidus (Friese): Cockerell 1936: 481.
Scrapter nitidus (Friese): Eardley 1996: 43–45.

Material examined: 1 ♀ KENYA: Rukinga Ranch, Pikapika Lodge (03°55.1S:39°24.5E), 25.vi.2003, W. Kinuthia, D. Martins, C. Eardley and B. Gemmill (SANC).

Remarks: Basic measurements of this specimen are: head length 1.7 mm, head width 2.1 mm and mesoscutum length 1.3 mm. This single specimen keys out to *S. nitidus* in Eardley's (1996) key and agrees excellently with Eardley's redescription of the species. Davies compared the Kenyan specimen against *S. nitidus* specimens from Villiersdorp and Ceres (Western Cape, South Africa) and, despite careful examination, could find no meaningful differences between them. Identifying features of the Kenyan specimen include the presence of a clypeal sulcus, slit-like facial fovea, 'concertina-like' propodeal triangle sculpture (see Eardley 1996, fig. 2), entire metabasitibial plate, dense mesoscutal punctation, black prepygidial fimbria and raised ocellar triangle. The specimen has an all-black metasoma, simple claws and antennae that extend to the tegulae.

S. nitidus was previously believed to extend from the KwaZulu-Natal Drakensberg foothills southwards to Western Cape and then northward to Namaqualand, Northern Cape. Most specimens have been collected in the Fynbos and Succulent Karoo biomes (Eardley 1996). Rukinga Ranch is part of Tsavo Game Reserve, southern Kenya, and is an enormous and unexpected range extension of *S. nitidus* and the genus itself. The most northerly record to date of *Scrapter* was of *S. absonus* from Victoria Falls, Zimbabwe. It is important to note here that Cockerell (1944: 805) described *S. ugandica* from Madi in Uganda. This Cockerell species, and several others, were unfortunately overlooked during the revision of Eardley (1996). These taxa will be dealt with in a forthcoming publication, but it is sufficient to observe that *S. ugandica* is not a *Scrapter* species, but rather a ctenoplectrinid (Apidae), and the range extension of *Scrapter* to East Africa stands. Rukinga Ranch is a dry, hot, low-lying area dominated by *Commiphora* woodland (Eardley pers. obs.). Very few *Scrapter* species have been recorded from savanna. The remarkable discovery of *Scrapter* in East Africa suggests there are probably other *Scrapter* species distributed up through Mozambique, Tanzania and Kenya.

ACKNOWLEDGEMENTS

Davies thanks the Natal Museum Council and Directorate for allowing him to continue this research, which began at the University of KwaZulu-Natal. Davies also acknowledges the extremely interesting material loaned by Dr M. Kuhlmann (University of Muenster, Germany). Dr M.B. Mostovski, Dr B.R. Stuckenberg, Mrs C.M. Conway and Mrs L. Davis provided assistance on various matters. Incisive comments which improved this paper were made by Mr E.A.B. Almeida (who also forwarded a useful reference), Prof. B.N. Danforth (both Cornell University) and Prof. M.S. Engel (University of Kansas). This research was supported by the National Research Foundation (NRF).

REFERENCES

ALEXANDER, B.A. & MICHENER, C.D. 1995. Phylogenetic studies of the families of short-tongued bees (Hymenoptera: Apoidea). *University of Kansas Science Bulletin* **55**: 377–424.

COCKERELL, T.D.A. 1936. Descriptions and records of bees. *Annals and Magazine of Natural History* (Ser. 10) **17**: 24–31.

———1944. Some African bees. *Annals and Magazine of Natural History* (Ser. 11) **11**: 804–814.

COWLING, R.M. & HILTON-TAYLOR, C. 1994. Patterns of plant diversity and endemism in southern Africa: an overview. *In*: Huntley, B.J., ed., *Botanical Diversity in Southern Africa*. Pretoria: National Botanical Institute, pp. 31–52.

EARDLEY, C.D. 1996. The genus *Scrapter* Lepeletier & Serville (Hymenoptera: Colletidae). *African Entomology* **4**: 37–92.

ENDRÖDY-YOUNGA, S. & CROWSON, R.A. 1986. Boganiidae, a new beetle family for the African fauna (Coleoptera: Cucujoidea). *Annals of the Transvaal Museum* **34**: 253–273.

ENGEL, M.S. 2001. A monograph of the Baltic Amber bees and evolution of the Apoidea (Hymenoptera). *Bulletin of the American Museum of Natural History* **259**: 1–192.

———2004. Fideliine phylogeny and classification revisited (Hymenoptera: Megachilidae). *Journal of the Kansas Entomological Society* **77**: 821–836.

———2005. Family-group names for bees (Hymenoptera: Apoidea). *American Museum Novitates* **3476**: 1–33

FRIESE, H. 1909. Die Bienen Afrikas nach dem Stande unserer heutigen Kenntnisse. *In*: Schultze, L., ed., Zoologische und Anthropologische Ergebenisse einer Forschungsreise im Westlichen und Zentralen Südafrika in den Jahren 1903–1905, Band 2. *Denkschriften der Medizinisch-Naturwissenschaftlichen Gesellschaft zu Jena* **14**: 83–476.

———1925. Die Urbienengattung *Polyglossa* FR. in Südafrika. *Zoologische Jahrbücher* **49**: 513–519.

GESS, S.K. 1992. Biogeography of the masarine wasps (Hymenoptera: Vespidae: Masarinae), with particular emphasis on southern African taxa and on correlations between masarine and forage plant distributions. *Journal of Biogeography* **19**: 491–503.

GREATHEAD, D.J. & EVENHUIS, N.L. 2001. Annotated keys to the genera of African Bombylioidea (Diptera: Bombyliidae; Mythicomyiidae). *African Invertebrates* **42**: 105–224.

ICZN. 1999. International Code of Zoological Nomenclature. Fourth edition. London: International Trust for Zoological Nomenclature.

LEPELETIER DE SAINT-FARGEAU, A.L.M. & AUDINET-SERVILLE, J.G. 1828. [Article] *In*: Latreille, P.A., ed., *Encyclopédie Méthodique: Histoire naturelle: Entomologie, ou histoire naturelle des Crustacés, des Arachnides et des Insectes* (Volume 10, Part 2). Paris: Agasse.

LOMBARD, A.T., HILTON-TAYLOR, C., REBELO, A.G., PRESSEY, R.L. & COWLING, R.M. 1999. Reserve selection in the Succulent Karoo, South Africa: coping with high compositional turnover. *Plant Ecology* **142**: 35–55.

LONDT, J.G.H. 1994. Afrotropical Asilidae (Diptera) 26. Ethological observations, and a possible ecological classification based on habitats. *Annals of the Natal Museum* **35**: 97–122.

MCGEOCH, M.A. 2002. Insect conservation in South Africa: an overview. *African Entomology* **10**: 1–10.

MCGINLEY, R.J. 1981. Systematics of the Colletidae based on mature larvae with phenetic analysis of apoid larvae. *University of California Publications in Entomology* **91**: 1–307.

MELO, G.A.R. & GONÇALVES, R.B. 2005. Higher-level bee classifications (Hymenoptera: Apoidea: Apidae *sensu lato*). *Revista Brasileira de Zoologia* **22**: 153–159.

MICHENER, C.D. 1944. Comparative external morphology, phylogeny, and a classification of the bees (Hymenoptera). *Bulletin of the American Museum of Natural History* **82**: 151–326.

———1965. A classification of the bees of the Australian and South Pacific regions. *Bulletin of the American Museum of Natural History* **130**: 1–362.

———2000. *The Bees of the World*. Baltimore: The John Hopkins University Press.

MILTON, S.J., YEATON, R.I., DEAN, W.R.J. & VLOK, J.H.J. 1997. Succulent Karoo. *In*: Cowling, R.M., Richardson, D.M. & Pierce, S.M., eds, *Vegetation of southern Africa*. Cambridge: Cambridge University Press, pp. 131–166.

RUTHERFORD, M.C. & WESTFALL, R.H. 1994. Biomes of southern Africa: an objective categorization. *Memoirs of the Botanical Survey of South Africa* **63**: 1–94.

SINCLAIR, B.J. 2002. Revision of the South African endemic genus *Edenophorus* Smith (Diptera: Empididae). *African Invertebrates* **43**: 109–122.

STUCKENBERG, B.R. 1996. A revised generic classification of the wormlion flies of Southern Africa previously placed in *Lampromyia* Macquart, with reinstatement of *Leptynoma* Westwood 1876, and descriptions of a new subgenus and two new species (Diptera, Vermileonidae). *Annals of the Natal Museum* **37**: 239–266.

———1998. A new Namibian wormlion species, with an account of the biogeography of *Leptynoma* Westwood *s. str*. and its association with anthophily in the Fynbos and Succulent Karoo Biomes (Diptera, Vermileonidae). *Annals of the Natal Museum* **39**: 165–183.

———2000. *Namamyia*, a new genus of Vermileonidae (Diptera) from Namaqualand, with a conspectus of the Southern African genera and an account of their adaptations for anthophily. *Annals of the Natal Museum* **41**: 181–202.

VAN WYK, A.E. & SMITH, G.F. 2001. *Regions of floristic endemism in southern Africa*. Hatfield: Umdaus Press.

WHITEHEAD, V.B. & EARDLEY, C.D. 2003. African Fideliini: Genus *Fidelia* Friese (Hymenoptera: Apoidea: Megachilidae: Fideliinae). *Journal of the Kansas Entomological Society* **76**: 250–276.